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THE formal announcement has just been made by M. Lockroy, the French Minister of Commerce, that a Universal Exposition will be opened in Paris on the fifth of May, 1889, and will be closed on the thirty-first day of the following October. The principal exhibition buildings will be situated on the Champ de Mars, extending from the Military School to the river, but supplementary buildings will be placed, if necessary, in the Esplanade of the Invalides, and along the quay which connects this with the Champ de Mars; and on the right bank of the Seine the Palace of Industry, and the available portion of the Trocadero Palace, with the gardens attached to each, will be utilized for certain departments of the great fair. Although much opposition has been made to the occupation of the Champ de Mars, the largest open space remaining in Paris, for the exhibition, there is no doubt that, so far as strangers are concerned, it offers by far the most convenient situation in the city. Under the arrangement now decided upon the foreign visitor, instead of being obliged to go every day in a crowded railway train to one of the many suburban villages which were proposed as suitable sites for the exhibition buildings, will need only to walk from his hotel in the Rue de Rivoli, or his lodgings in the Boulevards, across the Place de la Concorde, to find himself at the entrance of the Palais de l'Industrie, which is very likely to contain an exhibit of fine arts, while its garden, close by, will probably be utilized for the best of the horticultural displays. From this garden he has only to cross a bridge to find himself at the entrance of the Invalides enclosure, where other departments will be placed, and when he has completed his inspection of these, a short stroll along the river bank, which will be lined with novelties in the way of buildings, will bring him to the Champ de Mars, the central point of the exhibition, immediately opposite which is the Trocadero, with its garden. For those who prefer to lodge at a distance, the Seine steamboats will furnish convenient transportation to several points in the group of buildings, and tramway cars and omnibuses will carry those who prefer to travel by land.

THE general direction of the Exposition is in the hands of the Minister of Commerce, who will be assisted by a council of three hundred members, divided into twenty-two commissions, each of which takes charge of a certain part of the work. For receiving and taking care of exhibits, special committees are to be appointed. In France, each territorial department has its own committee, which is expected to do what it can to interest local manufacturers and artists in the exhibition, and to receive and take care of their goods; and foreign nations are expected to appoint similar commissions, to see to the interests of their own countrymen. Those who are disposed to exhibit are allotted space in the buildings or grounds free of all charge, and, if they wish it, are supplied gratuitously with steam-power, water and gas, but they must furnish their own cases or shelves, and, if they wish for power, they will have to bring it with their own belts or gearing from the main shafts to their machines. The general catalogue, in French, will be published by the Administration of the Exposition, and no other catalogue in French will be allowed to be sold, but foreign nations will be permitted, through their commissioners, to prepare and sell catalogues in their own language of the exhibits in their section. So far as possible, protection will be given to inventors and designers, by forbidding the sketching or photographing of any object without the written permission of the person who exhibits it, countersigned by the Director of the Exposition; and certain guarantees against piracy are afforded, under a special law enacted for the purpose. The exhibition buildings will be constituted official warehouses, and the goods displayed in them may be brought in free of all customs or *octroi* duties. Among the works of art, which most interest us, will be admitted paintings, drawings, sculptures, architectural models, drawings, designs and restorations, medals, engravings and lithographs, by native or foreign artists, executed since May 1, 1879. All drawings and paintings must be framed, and a special jury will make the selection of those to be admitted. Where the objects exhibited are samples of regular manufactures, it is earnestly requested that the regular price should be marked on them, not only for the information of the public, but as an element in the estimation of their merit. Much pains is apparently to be taken to have the collection of methods and appliances for education, particularly of technical education, as full as possible, and this will undoubtedly be one of the most valuable portions of the exhibition, but many other portions will be of great interest, even to those without special knowledge of the subjects which they illustrate. Whether, as there is some reason to fear, international animosities and distrusts will interfere with the comprehensiveness which should give its principal value to the exhibition, remains to be seen, but it is said that the Germans, who rather rudely refused to take part in the last affair of the kind in Paris, have had reason to repent of their ill-humor, and if they will set the example of cordial co-operation with the most amiable and hospitable nation in the world, in its great love-feast of peace and prosperity, they will certainly do themselves no harm, and will help materially to enlist the interest of other people, to the mutual advantage of all.

IN the present state of knowledge, it may be assumed as proved that typhoid fever and poisoning from drains or vaults are inseparably connected, and the man who lives in a town supplied with good sewers is, on an average, less than half as likely to be afflicted with this dreadful disease than one who is obliged to dwell among cesspools. Even after the soil of a city has become irreclaimably foul, as it is in nearly all large towns, a change in the system of disposal of refuse, by which the addition of new pollutions to those already existing is avoided, is always, as it seems, followed by an abrupt diminution of the death-rate from typhoid fever and kindred diseases. The comparison and compilation of health statistics, with their relation to circumstances of drainage and ground-water, is as yet hardly begun, but the *Revue Scientifique* gives a few data in relation to the larger European towns which are interesting. According to these, the abolition of the system of depositing house wastes in large *fosses* or cesspools, to remain there until removed by the public authority, which was until within about twenty years almost universal in Continental cities, has been already followed by surprising results in diminishing the mortality from all causes, but more particularly from typhoid diseases. In Berlin, where the first attempts to improve upon the old system were made in 1875, the total annual mortality has been reduced by nearly one-fourth, while that from typhoid fever is now about one-half the average of the years preceding the change. In Brussels, where cesspools were replaced by sewers in 1870, the mortality from typhoid fever fell at once to about one-third of its former proportion, and the improvement continued, perhaps by some gradual amelioration of the condition of the soil, so that the rate now is little more than one-fourth of the old average. At Frankfort nearly similar results were obtained, and in London, which, as a sewered city, is usually compared with Paris, where most of the house wastes are still received into

cesspools, the annual number of deaths from typhoid fever, out of each one hundred thousand of the population, is twenty-six, and from diphtheria eighteen, while, out of the same number of persons in Paris, seventy die every year from typhoid fevers and seventy-five from diphtheria.

A NEW mode of treating clay for use as a water-proofing material has, according to the *Builder*, been devised by Mr. Thomas Fraser, of Aberdeen, a gentleman interested in the manufacture of bricks and tiles. It is usual in puddling with clay, to prevent the penetration of water, to place the clay in trenches, or between rows of sheet piling, in a plastic condition, mixing it first with water, and tempering carefully before using. It occurred to Mr. Fraser to test the permeability to water of clay tempered with various proportions of water, and he found that when mixed with all the water that the solid mass would take up, the clay was easily penetrated by liquids. It appeared also that as the clay absorbed moisture, it increased in volume, and he reasoned from this that conversely, if the volume were prevented from increasing, absorption would be restricted, and the clay might be maintained with certainty at such a point of moisture as to have its maximum resistance to penetration by water. In order to accomplish this result, it would only be necessary to put the clay in place in the form of fine dry powder, packed in so tightly as to be incapable of absorbing more than a certain percentage of water. In practice, Mr. Fraser proposes to reduce the clay to very fine powder, and pack it into the trenches in the ordinary way. So treated, it is found, when the water is allowed to reach it, to absorb about thirty-five per cent of its weight, but the expansion due to this compresses the mass so much that it remains impenetrable.

MOST people think that Paris is, above all others, the city of fireproof construction, and it is indeed rather surprising to find that in a place where cellar ceilings are almost always vaulted in brick or stone, while floors are usually laid with iron beams, and stairs are commonly of stone, the number of fires is, for the population, almost equal to the average number in New York, the total number for 1885 having been twenty-five hundred and thirty-eight. Although the usual Paris construction, when subjected to an intense heat, often fails completely, as it did on the occasion of the burning of the great dry-goods store known as the *Printemps*, which was a mass of ruins in an hour after the breaking out of a fire among the goods exposed for sale, it resists a small conflagration for some time, and we find that three-fourths of the fires of 1885 were of slight importance, and that only twelve resulted in serious loss, the total damage from all the fires being estimated at a little over a million dollars. The force of firemen on duty numbers seventeen hundred and forty-three, while that of London, a city of twice the size, and, as a rule, much less solidly built, contains only six hundred and sixty-nine men.

LIKE most agricultural countries in Europe, France often suffers from late spring frosts, which destroy the young vegetation, and do a great deal of mischief. It has been seriously proposed of late to guard against these by building fires about the fields, with the idea that the warmth would avert the frost. There is no doubt that they would be effectual, if there were enough of them, but some late inventors, more scientific than the rest, remembering that such frosts never occur on cloudy nights, for the reason that the clouds prevent the radiation of heat from the earth, and the consequent chilling of the ground, proposes to combine the warming effect of fires with the production of artificial clouds, which he thinks would, like natural clouds, assist in preventing radiation from the ground, and consequent freezing. The method for accomplishing this result devised by the latest of these investigators, M. Salvat, consists in placing about the fields to be protected what might be called cartridges, consisting of truncated cones, formed of a mixture of pitch, rosin, oil, coal-tar, bits of wood and combustible rubbish, all mixed with earth. These cones stand on three short wooden legs, and a hollow in the base contains a bunch of shavings, soaked in coal-tar. The material of the cones being water-proof, they may be exposed to the weather for an indefinite period without injury, and the shavings for kindling, which need to be kept dry, are protected by the mass about them, so that they can be lighted at a moment's notice, in any sort of weather. The materials burn with a great deal of smoke, and a row of twenty or twenty-five cones, placed on the north and east sides of a two-acre vineyard, on the quarter from which the cold winds come, as they do with us from the north and west, is found sufficient to ward off any ordinary spring frost. The only objection to the plan would seem to be in the effect of the smoke on tender vegetation. Few things are more injurious to plants than the vapor of coal-tar, and the young shoots of vines are particularly sensitive to noxious influences.

THE *Revue Industrielle* speaks of a new device for electric signalling at sea which promises to be useful in practice. Every one knows that the ordinary communication, by means of flags, which takes place between vessels passing within sight of each other by daylight, is often of great importance to their owners, and as nearly all first-class steamships now utilize a part of their surplus power in electric lamps, it is natural enough that some attempt should have been made to employ these as a substitute for flags for night signals. The earliest method invented for the purpose depended upon the variations of current in an incandescent lamp; but the light of these is hardly bright enough for the purpose and the changes in intensity of incandescence take place rather slowly, so that the most recent system, which employ arc lights, seems likely to be much better. In this system, which is due to Mr. Kalezowski, of Berlin, an arc light is fixed to the mast, and supplied by a dynamo-machine under the control of the engineer. On its way to the lamp, the current passes through a Morse instrument, supplied with a band of paper, and the signals transmitted by the lamp are by this means copied, so to speak, on the paper, which serves as a permanent record. In certain cases, particularly in naval manœuvres, this record would be of great value, and it is to be hoped that the new invention will prove simple enough for ordinary use.

ABOUT three thousand people in Albany, including a great many who will find it hard work to save up enough money before cold weather to carry them and their families through the season of frost and enforced idleness, were, at last accounts, learning something from that harsh but thorough master, Experience, in regard to the pleasures and advantages of interfering in other people's quarrels. It seems that certain local manufacturers of building materials, bricks and cement being more particularly mentioned, had thought fit to employ men in their works who did not belong to tho-e degrading associations known as unions. After their usual cruel and cowardly fashion, the petty tyrants who drive the unions undertook to find means to ruin the manufacturers who disregarded their orders, and to starve the families of the men who declined to become their slaves, and with this object they conspired with the managers of the unions existing among workmen in the building-trades to force the master-builders of the city, by threats of ordering a general strike of their men, to refrain from buying any bricks or cement made by the proscribed manufacturers. It is hardly necessary to say that men who possess sense and courage enough to carry on a contractor's difficult business are not likely to be much pleased with the proposition that they shall allow themselves to be used as cats-paws by a few vindictive rascals to ruin their own friends, and the Albany builders, finding that they must accede or fight, unanimously chose to fight, and, following the modern maxims of war, which point out the advantage of carrying on a campaign in the enemy's territory, rather than in one's own, they not only replied to the demand made upon them by a refusal, but gave notice that unless the boycott against the offending brick and cement manufacturers were formally removed before a certain day, they would themselves, on that day, discharge all their union workmen, and suspend building operations. The appointed day arrived without any appearance of concession on either side, and the contractors, true to their word, closed their offices and stopped work. As the interest of the chief boycotters evidently lay in prolonging a struggle which brought them into prominence, and there was no reason to suppose that they would show much consideration for those who had meekly followed them into the fray, the more capable and independent among the men packed their tools without delay, and started for New York and Charleston, where they knew that they would be tolerably sure of employment at good wages until the agitators came after them, bringing with them their train of discord and misery.

EARLY SETTLER MEMORIALS.[1]—II.

John Bridge, Cambridge, Mass. T. R. and M. S. Gould, Sculptors.

WE have spoken at this length of "the Pilgrim," on account of the representative circumstances of its erection, the reputation of the sculptor who made it, and particularly with reference to a passage in the article in *Harper's Weekly*, already quoted from, wherein it is stated, in claiming due appreciation for "the Pilgrim," that "it has been the fate of an appalling proportion of all the public sculptures in this country — and the war was prolific in such memorials — to fall into the hands of thoroughly incompetent persons, sculptors of no training or cultivation, and for the most part vulgar pretenders in art, trading upon the inexperience and ignorance of those who had to do with them. There has been more to blush for in the practices and the productions of our sculptors, working at home or in Italy, than in all the shortcomings of all the other art of the country put together."

These words may be taken as representative of many similar expressions of reproach, which have appeared in the past few years in influential newspapers and magazines. It has become quite the fashion to berate the "pretenders in art," the "art-contractors" and the "builders of ungainly monuments," and to lay the entire blame for the multiplicity and inferior quality of these objects at the doors of this class of unnamed persons.

Is public sensibility so dull that comparison with such stuff is necessary in order to demonstrate the merits of "the Pilgrim?" There was a time in this country when the "Greek Slave" gained in public estimation by the assertion that it was "superior to Greek sculpture," and when a piece of white marble resembling the form of a nude female, though possessing in its execution nothing but the grossest ignorance and pretence, was accepted as a masterpiece of sculpture. We supposed this time was past.

Who is responsible for the "appalling proportion of all the public sculptures in this country" that have been made by "thoroughly incompetent persons, sculptors of no training or cultivation, and for the most part vulgar pretenders in art, trading upon the inexperience and ignorance of those who had to do with them?"

We feel pretty certain that upon examination it will be found that public approval and the committees on monuments and statues have had quite as much to do with the production of bad statues and horrid monuments as the berated "pretender in art" who manufactured them; and that, unpleasant as it may be, it is nevertheless true, that these vile objects are just what the people wanted; that they exactly gauge the prevailing public taste; that the existence, success, and constant increase of these "incompetent persons," contractors and accomplished business manufacturers of art, are the legitimate results of this taste, if taste it can be called; and that they owe their present active encouragement to the same cause. It will also be found that these things are as true of one locality as another — of cultured Boston, with its background of art history, and its eminent representatives of art activity, as of some unfamiliar hamlet in the mountains of Maine.

The Roger Williams Monument, Providence, R. I. Franklin Simmons, Sculptor.

Who are these simple souls who have been imposed upon and deceived by the "vulgar pretenders in art?" Are they the honest and credulous dwellers in the rural districts, who have never seen the mighty masterpieces of the ancient worlds, but owe all they know of sculpture to an occasional glimpse of one of John Rogers's groups, and to whom the single visit of some image-maker is sufficient recommendation to give an order for a soldier's monument? Or are they the leading citizens of their respective localities, men who have travelled abroad, and have been familiar all their lives with illustrations and copies of the best ancient sculpture, and are not strangers to the best art of to-day; men who boast of their knowledge of art, of their superior capacity for judging it, and who talk long and loud upon the progress it has made during their precious lives? We think these are the very men who are jointly responsible, with the public to support them, and the art-contractor to be manipulated, for the very large majority of the wretched sculptures that have been made for the past twenty years in this country.

Are these men so innocent and blind, so fearful of public condemnation, that they fall an easy prey to the monument hucksters who go about the country deceiving them? We fear not. They understand the situation; they fear no reproach, they ask for no excuse, especially on the score of inexperience and ignorance, and they gain nothing by experience. They are not so simple and ignorant of the ways of the world as might be supposed; on the contrary, they show an adroitness that serves them perfectly. They clothe themselves in an armor that is hard for the critic to penetrate. For they seek the advice and support of artists and "experts" to confirm their decisions, and they do not seek in vain. The progress of art, like other important movements, often finds its worst enemies in its own household. The best help the inexperienced, as well as the long-practised committee-man on monuments and statues receives, is that which is made known in this significant sentence: "The design has been examined and approved by many of the best artists."

Instances in proof of all this are too numerous to mention. To say that "incompetent persons" are able to trade upon the "inexperience and ignorance" of leading citizens, in matters of art as well as business, implies that the former are superior to the latter, a credit not always deserved. If it is true, then the first are unjustly named, and the last are not as wise as they ought to be.

It is a fact that in many instances the so-called incompetent person, the art-contractor, is "the smartest man in town," as well as a very bright and successful business man, and it does not require a very vigorous exercise of his ability to trade successfully "upon the ignorance and inexperience of those who have to do" with monuments, public buildings and statues. He also trades upon their assumed superior knowledge of art, and a conceit they cannot defend.

Monument to Count Cavour, Milan, Italy.

Not only are committees jointly concerned in the erection of bad monuments and statues, but they set the example and encourage rascally proceedings on the part of the "vulgar pretenders in art." They often expect and bind the sculptor to perform more than he possibly can accomplisd for the money he is to receive, or, as in some cases, he is obliged to divide his profits with some person who had influence with the committee. Here is the last occurrence of this kind that has come to our knowledge. In a certain city in a neighboring State a $30,000 soldiers' monument was in process of competition. A

[1] Continued from page 109, No. 558.

citizen of the place came to an untrained and uncultivated sculptor who wanted the job, and said, "I have subscribed $2,500 towards this monument; now, I have sufficient influence with the committee to get you the work, and I will get it for you if you will allow me $1,500. The poor sculptor wanted the work and wanted it badly enough to accept this proposal. The monument is in accord in its merits as a work of art with the character of this transaction. The sculptor was just $1,500 out of pocket, and the monument suffered so much more in consequence.

Miles Morgan, Springfield, Mass. J. S. Hartley, Sculptor.

In view of the favor shown to business ability, to success, to money-getting, to success at no matter what cost, and the indifference manifested towards art in this country, is it any wonder that the owners of large monumental and statue factories, or successful contractors of art, should receive the very large majority of orders for public and private monuments and statues? We think not. It may be a sad fact, but it is as logical and legitimate but it is as logical and legitimate as the operation of "fate" that it is so, process of cause and effect. There are those who say frankly, "The public does not know the difference between one statue and another. It is as likely to condemn as to admire a good one. Mr. Ward's statues are more carefully executed than those of A or B, but why should we pay $20,000 for a statue that is only a little better made than one we can get for $5,000? This does not indicate, perhaps, a very great regard for sculpture, but it does show that for workmanship alone there is not a universal disposition to pay an extravagant price.

THE ROGER WILLIAMS MONUMENT.

The Roger Williams monument was unveiled in Roger Williams Park, Providence, R. I., October 16, 1877. It was made by Franklin Simmons, of Rome, Italy, and is composed of a pedestal and two statues, one of Williams, and the other called "History;" the height of the former being seven feet six inches, and the latter six feet six inches. The book that Williams holds in his left hand is inscribed "Soul Liberty, 1636."

The strange claim is made for this monument that "This is probably the only monument in which the experiment has been tried of erecting two figures, one above the other, in the same composition, and the success is complete."

Whatever criticism may be made on this structure, in at least one important respect, the statue of Williams is better than "the Pilgrim." Mr. Simmons has tried to show what Roger Williams did. If the statue is neither strong nor imposing, it certainly is not coarse or pretentious.

MILES MORGAN.

The bronze statue, named Miles Morgan, was erected in Springfield, Mass., October 24, 1882. The subject of this statue was one of the early "planters" of that town, arriving there in 1636.

The statue with its pedestal was presented to the city of Springfield by Henry T. Morgan, of New York, a descendant of Miles Morgan in the fifth generation. The monument was erected without ceremony, the giver wishing no ostentation in connection with it. The figure is dressed in Puritan costume; carrying an old blunderbuss on its left shoulder, while the right hand holds a long-handled hoe. It is probably the funniest object set up as a statue in the United States, not excepting those used on soldiers' monuments.

He does not seem to feel the weight of the severities and solemnities of Puritan life, for that jaunty hat suggests more of the jollity of Merry Mount than of Plymouth asceticism. The statue was made by Mr. J. S. Hartley, of New York.

The Springfield papers speak ardently of the certain influence for good this statue is destined to have upon the progress of art in that city. They affirm that its excellence as a work of art will effectually prevent the advent of any bad statues, and set a high-water mark for greater progress in the future. "The Morgan" has one advantage over "the Pilgrim," in the lasting curiosity it excites. A curiosity that more than makes up for the absence of any quality of sculpture.

It is an enjoyable relief to see Miles Morgan, careless and indifferent, after beholding the awful Cromwellian responsibility of "the Pilgrim," and the monumental and nerveless sanctity of "the Roger Williams."

JOHN BRIDGE.

A bronze statue nine feet high, called "John Bridge, the Puritan," was unveiled on Cambridge Common, Mass., November 28th, 1882. The commission to execute it was given to the late T. R. Gould, of Boston. He died soon after beginning the work, and his son, M. S. Gould completed it. The whole monument was presented to the city of Cambridge by S. R. Bridge, a descendant in the sixth generation of John Bridge. John Bridge came to Cambridge in 1636, was one of the founders, and a very useful and honorable citizen of the town.

Those immediately interested in this statue claim that it represents with absolute correctness the costume of an "original Puritan," and that it is "an undoubted impersonation of the typical Puritan, in whose stern and resolute countenance is fully reflected the strong character of the men who founded our New England institutions of freedom and education." No comment has been made by the press upon this statue as a work of art.

The statues of Bridge and Morgan are confirmations of the existence in this country of two splendid facts, love for ancestors, and generosity in desiring to honor their memories. But the disparity between these statues as works of art, and the noble sentiments that inspired those who erected them is so great, that one is obliged to think it would have been better to have trusted to the ordinary processes of memory, rather than to have undertaken to perpetuate their remembrance in any such fashion.

T. H. Bartlett.

[To be continued.]

AN EDITOR'S TRIP ABROAD.[1]—XV.

LONDON SUBURBAN HOUSES.—SALISBURY.—THE EXAMINATION SCHOOLS, OXFORD.

THE weather was rainy and disagreeable as we sailed out of Boulogne harbor on our return trip across the Channel, and one of the party, at least, would have been decidedly happier for the next two hours if military expediency had not forbidden the completion of the tunnel which, two or three years ago, was on the point of making a land connection between France and England. Whether anything short of submarine railway communication will do away with the dreaded Channel sea-sickness seems to be doubtful. If I am not mistaken, the twin ship which was to float steadily across is now abandoned, and the efforts of the lines which compete with each other for the profitable international traffic seem to be directed entirely to the construction of very fast vessels, the one last put in commission having crossed from Dover to Calais in about seventy minutes, making at times a speed of twenty-five miles an hour. Although these little racers reduce the duration of the sea trip, and of the worst of the accompanying discomfort, their motion is so disagreeable that the sea-sickness provoked by it sometimes lasts through the railway journey which succeeds it, and passes off only when the train comes to a stop in London. Fortunately none of us were quite sensitive enough for that, and before arriving within sight of the dome of St. Paul's we were quite ready to enjoy the first sniff of that friendly smell of soft-coal smoke which welcomes the traveller to London; and, as we stepped out upon the platform, to find ourselves hailed in good old English by a dozen railway-porters and cab-drivers, it seemed to us as if a load, which had been weighing upon us for three months, was suddenly lifted off our minds. A little of it was perhaps replaced when the cab-driver, on arriving at the hotel, found himself dissatisfied with something more than his proper fare, but an extra sixpence made us perfect friends again, and he was, at least, neither so greedy nor so disagreeable as one of his brethren in Brussels, from whom we finally declined altogether to purchase peace, and left him to listen to the echoes of his maledictions which the pavement sent back to him.

The region about Piccadilly Circus, and from that westward to Hyde Park and South Kensington, and eastward to London Bridge, was already pretty familiar to us, so that we thought it desirable, for the better improvement of our minds, to take some pains to explore the more remote portions of the city, and found ourselves well repaid for our trouble. Interesting as are the great buildings in the interior of London, they do not, by any means, monopolize the architectural beauties of the town, and no one can fully appreciate the vast, homelike, English London without devoting a part of his time

[1] Continued from No. 561, page 145.

to Hampstead and Chelsea, Newington, Chiswick, and a dozen other suburban districts, which, not long ago, were quiet villages, but are now fast filling up with detached and semi-detached houses, of all grades, but all neat and homelike, and many of them extremely interesting. The best houses are, perhaps, to be found to the south and southwest of the city, where an immense space, extending now to the grounds of the Crystal Palace at Sydenham, has, within a few years, been occupied by new buildings, most of which are of a superior class, while many, with their beautiful grounds, must represent investments of money varying from fifty to a hundred and fifty thousand dollars, or even more. These suburban mansions, while far from possessing the dignity of a great country house, buried in the middle of its acres of park, have in place of it an air of domestic elegance and comfort which is quite as interesting in its way. I tried my best to discover, by analyzing and comparing the houses that most took my fancy, the secret of the homelike flavor which the English architects succeed so well in imparting to their designs, but made very little progress, my conclusions being constantly upset by the result of fresh observations. In Brompton, for instance, I would become enamored of a lovely house with half-timbered gables, and would make a mental memorandum of the fact that half-timber and plaster were necessary ingredients of the most perfect expression of English domesticity, which would, in half an hour or so, be supplanted by another memorandum, derived from the study of a house still more charming than the other, to the effect that, when well treated, a composition of white brick, slightly relieved with red, was more satisfying in its picturesqueness than any timber construction. A little later I would qualify the last impression with the codicil that, for a house surrounded by the luxuriant vegetation universal in English gardens, neither white brick by itself nor any combination of this with red brick, could compare in warmth and richness with red brick used alone; and soon after I would find myself again convinced of the superiority of half-timber work to any other. On a calmer review of the whole subject I am disposed to think that no material, either for domestic or any other sort of architectural expression, can equal stone, but the best of the English architects treat the other ordinary materials in a way which cannot be too carefully studied. Next to the Southern suburbs the Northern districts of London are, perhaps, the richest in architectural pleasures, and, as these are rather more closely built than the former, interesting objects occur more frequently. Perhaps the best things here are the churches, among which there are many of remarkable originality, but one continually comes across other clever bits of work, modest in construction and material, but full of thought and artistic feeling.

From the new to the old in England is never a very long step, and we observe some change in style and finish, but very little in the delightfully homelike expression of the buildings, between suburban London, the creation of the last two decades, and Salisbury, the central portion of which contains few houses less than a hundred and fifty years old, while many, of three and four hundred years standing, vie in neatness and comfort with the most recent of their neighbors.

In regard to design, after carefully endeavoring to separate the essential and intentional qualities of the older houses from the effects of time and accident, it seemed to me that although, like our own builders of a hundred and fifty years ago, the men who constructed the old houses which stand around the Cathedral Close were probably thoroughly drilled in a set of rules which prevented them from ever making such gross blunders in the proportioning of openings, or in the profiling of mouldings, as those which disfigure cheap or careless modern work, there was very little about their buildings that could be considered actually superior to those of the best architects of the present day, and I could see no way of accounting for the unspeakable charm of the old houses except by attributing it in part to the softening of the colors and lines by the action of the atmosphere, and the settlement of walls, and the bending of the rafters, which soon throws the rigid parallel lines of the roof tiling into delicate curves, but still more to the faint yet significant indications of alteration or repair which nearly all show, and which unconsciously excite our interest and sympathy, as do the lines which give character to a face by suggesting the mental and moral experiences through which its owner has passed.

This sort of adventitious charm, the shining of the Lamp of Memory, as Mr. Ruskin would say, probably counts for more in the pleasure which we take in observing old buildings than we generally imagine.

The wall which surrounds the Cathedral Close in Salisbury, a work apparently of the thirteenth century, perhaps modified somewhat later, is still almost intact, and forms one of the most interesting features of the town. In itself the wall is simple enough, consisting of limestone masonry, in some places crowned with battlements, but in others only tiled over to keep the rain out of the joints, and it would, to any one who knew nothing of its history, present no more attraction than any other fence wall, were it not for the circumstance that the masons who built it, six hundred years ago, to save themselves the trouble of cutting all the blocks out of new stone, utilized the materials of a Norman building, which they either found near by, or, more probably, brought over from the hill of Old Sarum, on which the original metropolitan church stood; and the blocks from the Norman church, carved with the elaborate fancifulness in which the monkish stone-cutters of the time of the Conquest delighted, still diversify the face of the wall with rosettes, bits of string-courses and cornices, and even grotesque heads, which once probably supported the crowning corbel-table. Rude and worn as these fragments are, they attract the eye and excite the imagination at once, and a single one would make an interesting object of a wall a hundred feet long and perfectly plain otherwise. Very little is thus needed to suggest some sort of story, and there are few old houses, particularly in England, where on account of the similarity of our ways of living we find it easier than elsewhere to read slight indications, which do not possess some attraction of the kind.

In modern buildings, which have no history, it is not easy to contrive much expression of sentiment, as we all know. The most successful example, as it seemed to me, that I saw in England of a recent structure, standing in the midst of ancient ones, was certainly Mr. Jackson's Examination Schools at Oxford. So far as the style of the building was concerned, it would be hard to set an architect a more difficult task than to harmonize his design with the conglomeration of Gothic of nearly all periods, side by side with Transition and Renaissance, which characterizes Oxford, but the problem has been solved with astonishing success, and there is no building in the city more thoroughly penetrated with the Oxford air, and yet more free from any appearance of a mixture of different styles. Most architects know well enough the appearance of the structure, from the drawings which have been published in the professional journals, but the drawings give little idea of the dignified aspect of the executed work, or its delightful harmony with the late Gothic and early Renaissance buildings which surround it. Inside, the beautifully-studied Transition style which marks the exterior is, as indeed it was in the ancient buildings from which Mr. Jackson derived his inspiration, a little more markedly classic in detail, and the magnificent stone and marble staircase and balcony which lead to the upper rooms would do no discredit to the richest of Italian palaces, while the woodwork, which is not very different in character from that of our own day, is ornamented with a delicacy and elegance remarkable even in the work of an English architect. There is more of Mr. Jackson's work in Oxford, where, by the way, the architect took his degree, but nothing else so important as the Schools. Next to these, the new buildings for Magdalen College, by Messrs. Bodley and Garner, pleased me most. Being in close connection with a group of late Gothic buildings, the new block was almost necessarily in the same style, but the architects had treated it with a particularly pretty composition of parts, and had made their sculptured detail quite equal in variety and execution to the old work next to it. I was curious to see how the much heralded buildings of fifteen or twenty years ago would compare with the more recent ones, and lost no time in making my way to Keble College and the Oxford Museum, only to find the impression that they made upon me when I saw them before confirmed. In fact, at that time, fresh from the reading of Mr. Ruskin's works, I endeavored conscientiously to find some beauty in them, and succeeded, at least, in impressing on my mind a sort of provisional toleration of them, but a second inspection discovered little in the way of new attractions.

FOR ILLUSTRATIONS

Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

"THE DAKOTA," NEW YORK, N. Y. MR. H. J. HARDENBERGH, ARCHITECT, NEW YORK, N. Y.

[Gelatine Print, issued only with the Imperial Edition.]

COMPETITIVE DESIGN FOR A $5,000-HOUSE, SUBMITTED BY "*Wynwyc.*"

EXCAVATIONS: Excavate for cellar under square portion of house; for trench-walls, piers, etc. Dispose of the earth in grading about the building, as may be directed.

Foundations. — Foundation walls to under side of sills to be of good rubble stonework, 1′ 6″ thick, and carried up to a proper height, to secure a cellar 6′ in the clear between under side of first-story floor-joists and top of concrete; all trench-walls 3′ 6″ deep in the ground.

Brickwork. — All brickwork to be of good hard-burnt, to be well laid, with all joints filled solid, all chimneys to be plastered on the inside and outside from cellar to under side of roof. All brickwork exposed on the outside of building to be laid with red mortar joints. Build all fireplaces with pressed brick; hearths of same. Build-in thimbles for ventilators and pipes in all rooms through which the chimneys pass.

Plastering. — Plaster all walls and ceilings in first and second stories one good coat of brown mortar, well smoothed on sides; give all ceilings a coat of white hard-finish. Plaster the ceiling of piazza with cement-mortar and dash with coarse gravel.

Framing. — Sills, 6′ 6″; studs, 2″ x 4″, and 3″ x 4″ for window and door openings. Corner posts and plates, 4″ x 6″; partition caps, 2″ x 4″; floor-beams, first and second floors, 2″ x 10″; all 16″ on centre

rafters, and collar-beams 2″ x 8″, set 28″ on centres; floor-beams cross-bridged once in 8′ 0″ of span. Cover outside of frame sides and roof with surfaced hemlock boards, square edge. Window-frames, except casement, to have pulleys, steel axle, best hemp cords, and weights to balance sash; casements to open out. Door-frames, 1½″-stuff, rebated, 1⅜″ for outside doors, and 1½″ for inside doors. Sash, 1½″ thick, as shown, glazed with double-thick German glass for large lights, single-thick for small lights. All doors to have good, substantial hardware.

Floors. — Lay under-floors in both stories with surfaced hemlock boards; finished floor first story, yellow pine, 3½″ wide; finished floor second story, ⅞″ spruce boards, 5″ wide. Inside trim 5½″ wide, moulded. Base-boards in first and second stories, 7″ wide.

Shingles. — Cover the sides and roofs with sawn cedar shingles, 5½″ to weather. Prepare and put in place 4″ x 6″ gutters. Mouldings, gable cornice, etc., all of white pine.

Bath-room to be finished in brown ash; wainscot 4′ 0″ high, beaded strips 3″ wide, with neat cap. Front stairs to be of ash, as per drawings. Back stairs boxed, and to be of yellow pine from cellar to second floor. Fit butler's pantry with sink closet, with cupboard below and glazed sliding-sash above, enclosing shelves. Kitchen pantry fitted up with shelves. Closets in chambers to have one shelf and twelve hanging-hooks; linen-closet fitted up with wide shelves.

Plumbing. — Furnish and set up range in kitchen, with water-back connected, with forty-gallon copper boiler. French bath-tub in bath-room, supplied with hot and cold water, and fitted with waste-pipe and plug, set up complete. Two Vendome water-closets — one in bath-room and one in cellar — connected with soil-pipe, which, in turn, is connected with sewer, with ventilation up to the highest point of roof. Set force-pump in kitchen, double-acting. All the interior finish to be of white pine, or whitewood, painted two coats of paint; all the exterior trimming will be painted two coats of paint. The shingles and piazza floors will be left the natural color. Wax the yellow-pine floors, first story, two coats.

Concrete cellar-bottom, 2½″ thick. Build cesspool and connect drain.

MASON'S ESTIMATE.

99	Cords stone, laid in wall, @ $3,	$297 00	
151	Yards dirt, @ 20c,	30 20	
8200	Brick, laid, @ $17,	139 40	
4	Fireplaces, @ $12 each,	48 00	
131	Yards concrete, @ 47c per yard,	61 57	
	Cesspool and drain,	41 00	
850	Yards one-coat plastering on wall, @ 20c,	170 00	
438	Yards two-coat plastering ceiling, @ 25c,	109 50	
	Sundries,	27 00	
			$923 67

CARPENTER'S ESTIMATE.

13600	Feet spruce timber, framed and put up, $25,	$330 00	
970	" hard-pine floor, put down, @ 8c,	77 60	
1693	" " " " first story, put down, @ 10c,	169 30	
2840	" spruce " second story, " " 6c.	170 40	
10650	" surfaced hemlock covering, put on, " $17,	181 05	
48000	Shingles on roof, put on, @ $6,	288 00	
18000	" " sides, " " $5,	90 00	
970	Feet white pine for trimming on exterior, put up, @ 6c,	58 20	
5	Dormer windows, put up complete, @ $16,	80 00	
6	Windows and sash, second story, put in complete, @ $5,	30 00	
18	" " first " " " " $6,	108 00	
1	Casement window, complete,	8 00	
2	Dutch doors and frames, put in complete, @ $15,	30 00	
14	Columns on piazza, put up complete, @ $3.25,	45 50	
1	Back door frame, put in " " $3.90,	3 90	
7	Doors and trim., first st'y, principal rooms, complete, @ $7,	49 00	
28	" " remainder of house, @ $5.50,	164 00	
800	Feet shelving, put up complete, @ $0.35 per foot,	28 00	
	Front and back stairs, put up complete,	187 00	
	Butler's pantry, finished complete, lumber, hardware, labor,	47 00	
	Kitchen " " " " " "	12 80	
2180	Feet base boards, 6″ high, put down, @ 4c,	87 20	
7	Kegs nails, @ $3,	21 00	
1	Chamber mantel,	13 00	
3	Mantels first story, @ $30,	90 00	
	Material and labor finishing bath-room, complete,	45 00	
	" " " water-closet in cellar, complete,	4 50	
	Seat in hall and library, material and labor,	10 60	
	6 bells, put in complete, @ $4,	24 00	
	Furnace piping and registers, put in complete,	171 00	
	Plumbers' work, complete,	276 00	
	Painters' work, interior and exterior,	215 00	
	Stained-glass hall-windows,	46 00	
	Range in kitchen, complete,	58 00	
	Grading around building,	85 00	
	Items and labor not included in the above,	475 00	$3778 85
	Builder's profit, 6 per cent on $4702.52,		284 15
			$4063 67

TOBACCO WORKS OF MESSRS. G. W. GAIL & AX, BALTIMORE, MD. MR. HENRY BRAUNS, ARCHITECT, CHICAGO, ILL.

This building has a frontage on Barre Street of 278 feet, and on S. Charles Street of 183 feet — with two interior court-yards of about 50′ x 100′ each — and has been enlarged from time to time, the first building having been erected about thirty years ago. The addition now being built is 134′ x 183′, and is to be used mostly for storage purposes, with a capacity for 5,000 hhds. of tobacco. Interior construction is with iron columns and girders. The exterior is faced with Baltimore pressed brick and granite cornices, etc. Cost of addition about $150,000.

ENDOLITHIC-MARBLE MANTEL FOR THE PLANKINGTON HOUSE, MILWAUKEE, WIS. DESIGN BY MR. CARYL COLEMAN, NEW YORK, N. Y.

This mantel, Persian in color and design, is wholly made of highly-polished Endolithic marbles, except the inner arch, which is constructed of red glazed brick. The prevailing colors are: a rich yellow Siena, a delicate reddish-yellow Numidian, and a deep blue Brecciated marble.

The decorations have all the sharpness of outline of a Florentine mosaic with great depth and transparency of color. The mantel is in a room where the floor and dado are also in decorated marble, while the walls and ceiling are painted to harmonize in color and design — everything being strictly and purely Persian.

HOUSE OF MR. H. M. DUNHAM, SOMERVILLE, MASS. MR. G. F. LORING, ARCHITECT, BOSTON, MASS.

HOUSE FOR H. F. CADY, ESQ., NEBRASKA CITY, NEB. MESSRS. MENDELSSOHN & FISHER, ARCHITECTS, OMAHA, NEB.

COMPETITIVE DESIGN FOR A $5,000 HOUSE, SUBMITTED BY "*Demavend.*"

BROOKLYN LIFE INSURANCE COMPANY'S BUILDING, LIBERTY STREET, NEW YORK, N. Y. MR. F. CARLES MERRY, ARCHITECT, NEW YORK, N. Y.

Unintentionally, the title of this plate was published in our last issue, and gave the impression to many that they received an imperfect copy, because the plate was not included in the illustrations.

AMERICAN ARCHITECT COMPETITION FOR HOUSE COSTING $5,000.[1]—VIII.

"*Wynwyc.*"—Plan is not good. Study not well placed; second story plan is poorly arranged; corridor narrow and dark; closets cut off much light in rooms. General lay-out of exterior very good, and details, though unskilful, are of a very good kind. With a different arrangement of plan this would make an excellent house. Rendering timid and uncertain.

"*Demavend.*" — Evidently a beginner's work. Plan requires extra servant; otherwise, ordinarily good. Details meagre. Exterior needs belts, eaves, mouldings, rakes. Roofed badly; termination of circular bay very bad. Rendering timid and unskilful; lettering poor.

"*Ivy.*" — Basement kitchen requires extra servant. Hall too large for house. Interior: mouldings and stair-case good; study fireplace all out of scale with room and not a clever conceit. Exterior details: mouldings lack proportion and small transitional members. Design commonplace. A truncated gable is always ugly, but when in combination with flap-dormers and a French-roofed piazza it is especially bad.

"*Veritas.*" — Novelist isolated. Waste space in hall and roof. Exterior details have too many sharp angles, giving very boxy look. Piazza roof joins house badly. Interior detail fairly good; proportions of first and second story walls to each other and to roof not good. Lettering very bad. Rendering weak.

"*Idle Hours.*" — Plan fairly good. Infants' room inconvenient. Separation of bedrooms, etc., from remainder of house good. Direct communication between dining-room and kitchen is not good. No constructive details. Exterior overdone, with details of all sorts without any regard to scale or purpose: stone, brick, plaster, open-timber work, shingles, zig-zag brickwork and skewbacks, diamond-square and roomed window-panes, and Classic garlands make a mixture that cannot fail to be conspicuous, but that belongs to just that class of buildings which are spiced to suit the imaginary public taste, and are more vicious than simple, ugly work. Rendering lacks concentration, and is labored, but rather effective.

"*Wamba.*" — Waste room in halls; bedrooms badly shaped; nursery too small. Interior details heavy. Exterior details made without much constructional knowledge. Exterior too much chopped up. Rendering of plans good. Rendering of perspective stiff in ruled lines; uncertain in freehand lines.

"*India Ink.*" — Back stairs dark. Too many chimneys. Details of interior commonplace and heavy. Exterior design poor; walls too high; window-panes too small; open-timber work not understood. Rendering of elevation and perspective extremely bad — spotty and scratchy.

[To be continued.]

A Dakota Peat-bog. — A hundred-acre peat-bog has been discovered near Ellendale, Dakota. The peat reaches to a depth of from seven to ten feet, and is said to overlay a surface of ice.— *Exchange.*

[1] Continued from page 111, No. 558.

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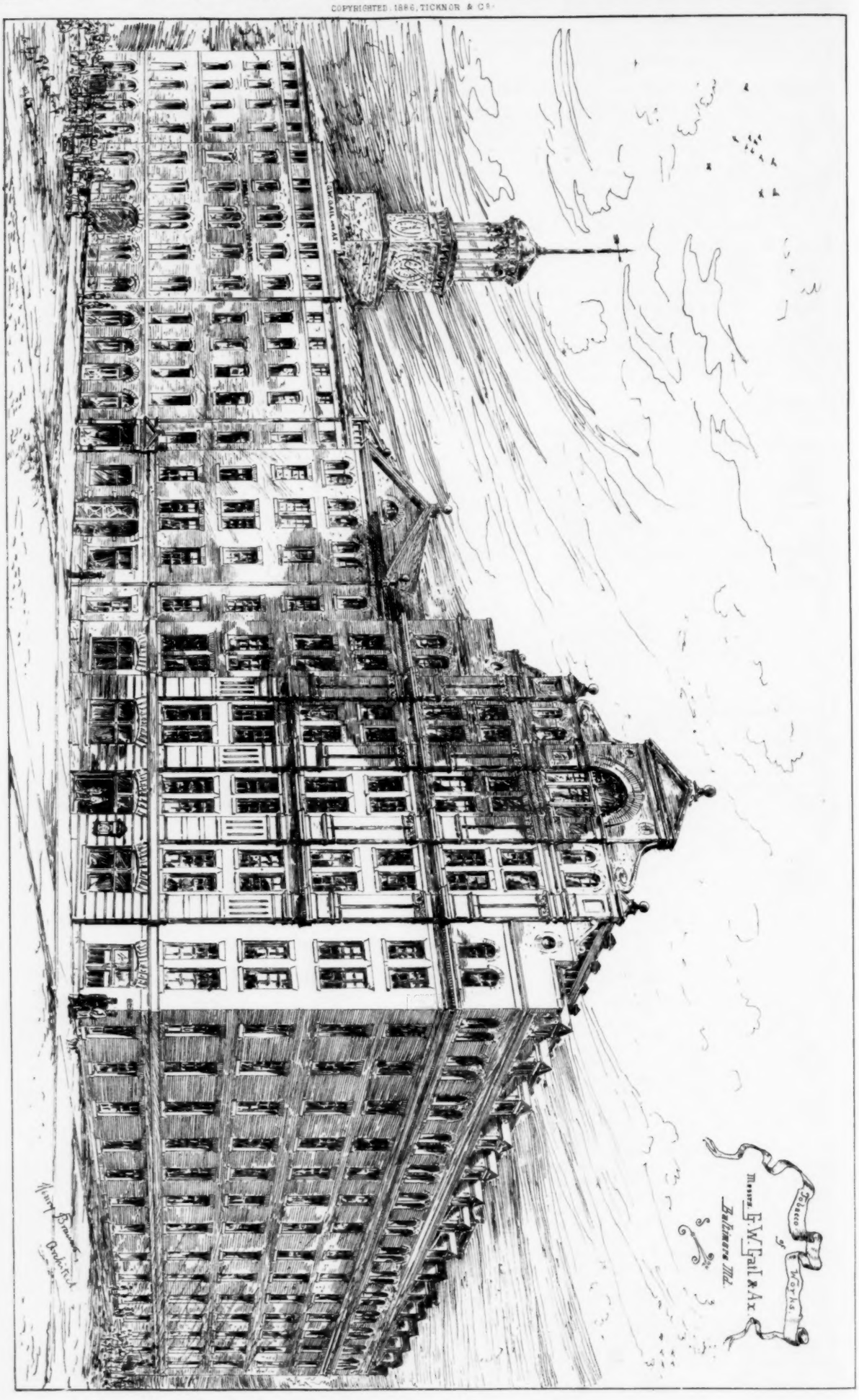

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AM. ARCH'T $5000 HOUSE COMPETITION.

Heliotype Printing Co. Boston.

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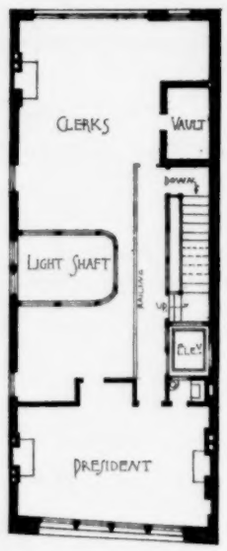
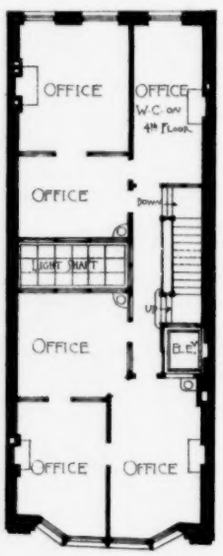
Brooklyn Life Ins. Co's Building, Liberty St., New York.

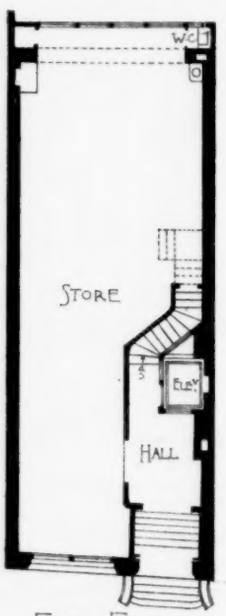
F. Carles Merry, Arch't. 150 B'way, N.Y.



Company's Offices
Fifth Floor



Third Floor
2 & 4 almost the same



First Floor.

0 10 20 30 Feet.

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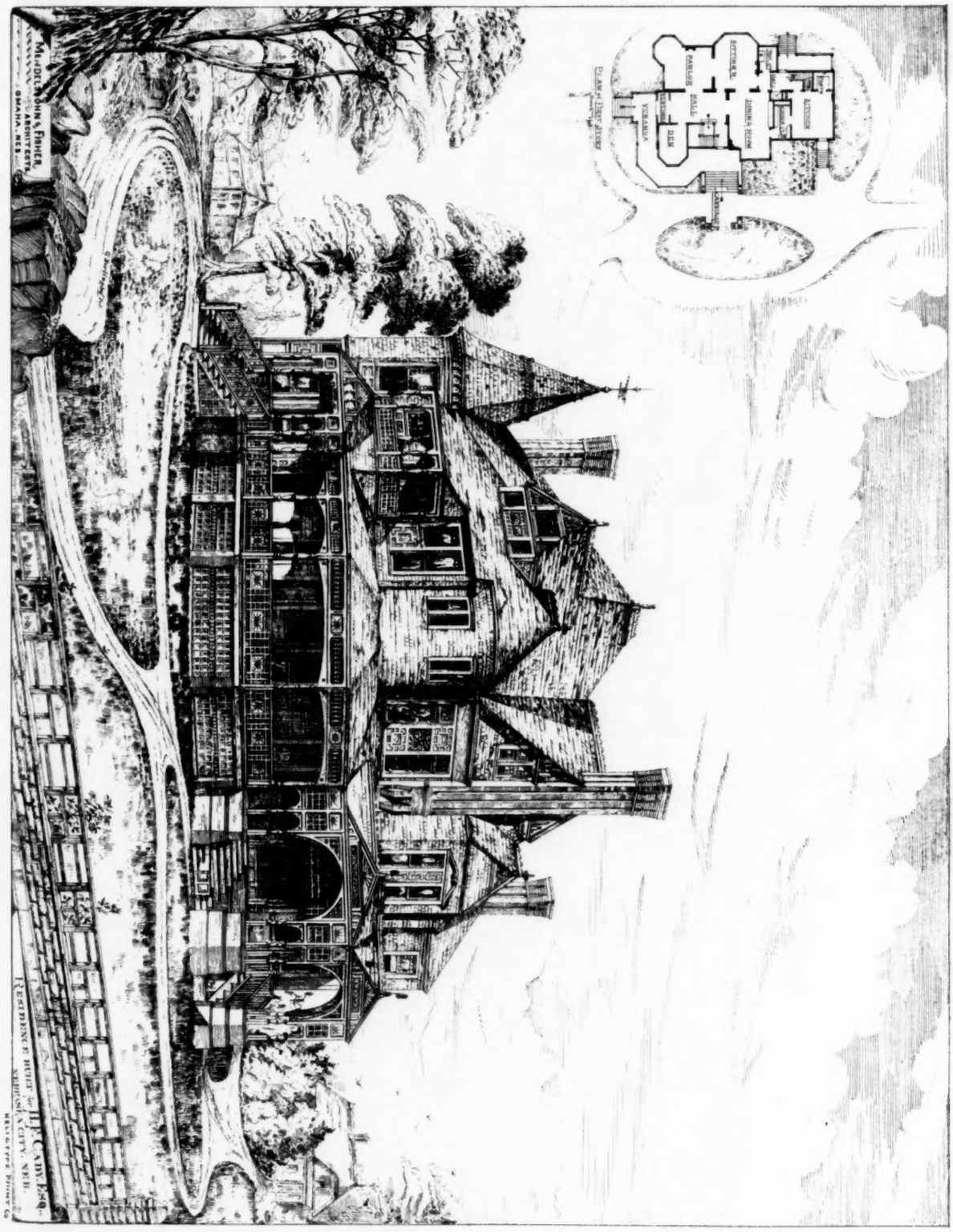

American Architect and Building News, Oct. 2, 1886. No. 562

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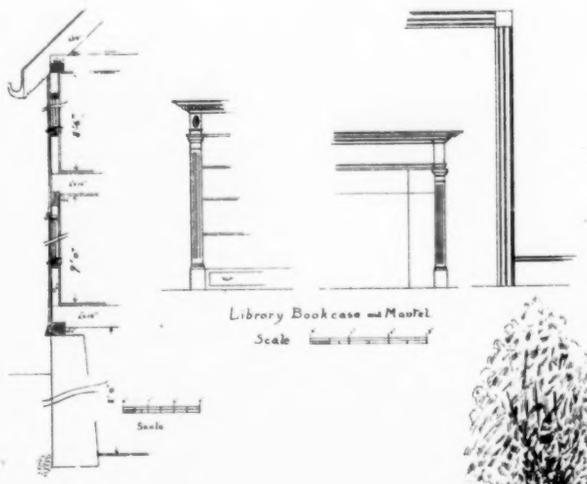

Perspective

Second Floor Plan

Scale for Plans

First Floor Plan

Front Elevation Scale

$5000. House Competition

Design Submitted by

Demavend

Heliotype Printing Co. Boston.

AMERICAN ARCHITECT AND BUILDING NEWS, OCT. 2, 1886. No. 562

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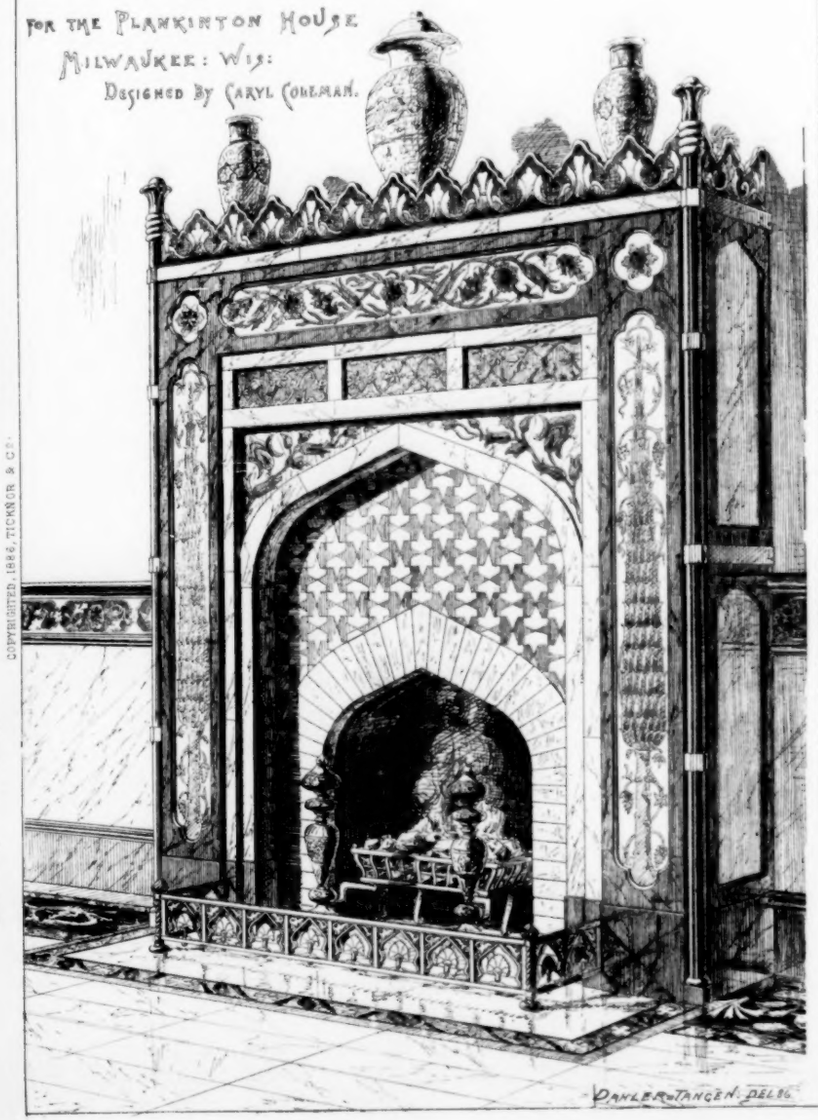
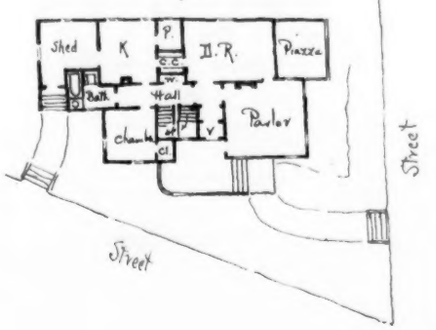
ENDOLITHIC MARBLE-MANTEL
FOR THE PLANKINTON HOUSE
MILWAUKEE: WIS:
DESIGNED BY CARYL COLEMAN.



DANLER & TANGEN. DEL. 86.

Second Floor

First Floor



Dwelling for H. M. Dunham
Somerville Mass. Cost $3500. not
including furnace —

G. F. Loring Arch.t
10 Tremont St.
Boston.

HELIOTYPE PRINT. CO.

SAFE BUILDING.[1]—VIII.

DEFLECTION.

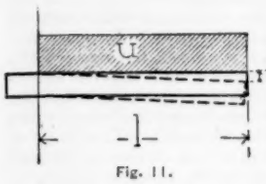


Fig. 11.

THE derivation of the following formulæ would be too lengthy to go into here, it will suffice for all practical purposes to give them. They are all based on the moduli of elasticity of the different materials, and are as follows:

FOR A CANTILEVER, UNIFORMLY LOADED.

$$\delta = \frac{1}{8} \cdot \frac{u.l^3}{e.i} \qquad (36)$$

FOR A CANTILEVER, LOADED AT FREE END.

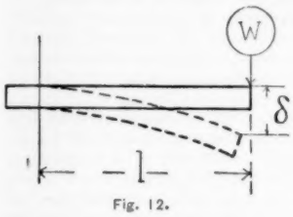


Fig. 12.

$$\delta = \frac{1}{3} \cdot \frac{w.l^3}{e.i} \qquad (37)$$

FOR A BEAM, UNIFORMLY LOADED.

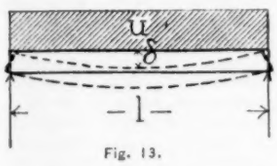


Fig. 13.

$$\delta = \frac{5}{384} \cdot \frac{u.l^3}{e.i} \qquad (38)$$

FOR A BEAM, LOADED AT CENTRE.

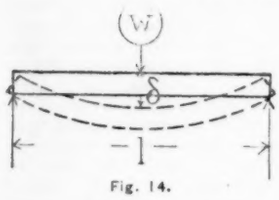


Fig. 14.

$$\delta = \frac{1}{48} \cdot \frac{w.l^3}{e.i} \qquad (39)$$

FOR A BEAM, LOADED AT ANY POINT.

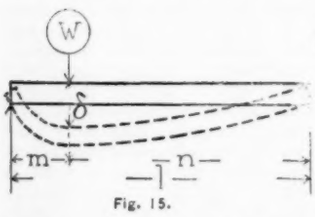


Fig. 15.

Greatest deflection is at the point where load is applied.

$$\delta = \frac{w.m.n.(l+n)}{9.l.e.i.} \cdot \sqrt{\frac{m.(l+n)}{3}} \qquad (40)$$

Where u = uniform load, in pounds.
Where w = concentrated load, in pounds.
Where l = length of span, in inches.
Where e = the modulus of elasticity, in pounds-inch, of the material, see Tables IV and V.
Where i = the moment of inertia, of cross-section, in inches.
Where m and n = the respective distances to supports, in inches.
Where δ = the greatest deflection, in inches (see Formulæ 28 and 29).

For a cantilever, with concentrated load, at any point, use Formula (37), inserting distance x (in inches) of load from support, in place of l, or:

$$\delta = \frac{1}{3} \cdot \frac{w.x^3}{e.i} \qquad (41)$$

EXPANSION AND CONTRACTION OF MATERIALS.

Expansion of Iron trusses. All long iron trusses, *say about eighty feet long, or over,* should not be built-in solidly at both ends; otherwise the expansion and contraction due to variations of the temperature will either burst one of the supports, or else cause the truss to deflect so much, as to crack, and possibly endanger the work overhead. One end should be left free to move (lengthwise of truss) on rollers, but otherwise braced and anchored, the anchor sliding through slits in truss, as necessary. The expansion of iron for each additional single degree of temperature, Fahrenheit, is about equal to $\frac{1}{145000}$ of its length, that is, a truss 145 feet long at 10° Fahrenheit, would gain in length (if the temperature advanced to 100° Fahrenheit), $-\frac{90.145}{145000} = \frac{9}{100}$ of a foot, or, say, $1\frac{1}{2}$ inches, so that at 100° Fahrenheit the truss would be 145 feet and $1\frac{1}{2}$ inches long; this amount of expansion would necessitate rollers under one end. Of course the contraction would be in the same proportion. The approximate expansion of other materials for each additional degree Fahrenheit would be (in parts of their lengths), as follows:

Expansion and contraction of materials.

Wrought-iron	$\frac{1}{145000}$	Pewter	$\frac{1}{78000}$
Cast-iron	$\frac{1}{162000}$	Platina	$\frac{1}{208\,00}$
Steel	$\frac{1}{151000}$	Zinc	$\frac{1}{62000}$
Antimony	$\frac{1}{166000}$	Glass	$\frac{1}{210000}$
Gold, annealed	$\frac{1}{123000}$	Granite	$\frac{1}{208000}$
Bismuth	$\frac{1}{130000}$	Fire Brick	$\frac{1}{365000}$
Copper	$\frac{1}{104000}$	Hard Brick	$\frac{1}{650000}$
Brass	$\frac{1}{95000}$	White Marble	$\frac{1}{173000}$
Silver	$\frac{1}{95000}$	Slate	$\frac{1}{173000}$
Gun metal	$\frac{1}{90000}$	Sandstone	$\frac{1}{103000}$
Tin	$\frac{1}{87000}$	White pine	$\frac{1}{440000}$
Lead	$\frac{1}{63000}$	Cement	$\frac{1}{120000}$
Solder	$\frac{1}{70000}$		

The tension due to each additional degree of Fahrenheit would be equal to the modulus of elasticity of any material multiplied by the above fraction; or about 186 pounds per square inch of cross-section, for wrought-iron. Above figures are for linear dimensions, the superficial extension would be equal to twice the linear, while the cubical extension would be equal to three times the linear.

Water is at its maximum density at about 39° Fahrenheit; above that it expands by additional heat, and below that point it expands by less heat. At 32° Fahrenheit water freezes, and in so doing expands nearly $\frac{1}{12}$ part of its bulk, this strain equal to about 30,000 lbs. per square inch will burst iron or other pipes not sufficiently strong to resist such a pressure. The above table of expansions might be useful in many calculations of expansions in buildings; for instance, were we to make the sandstone copings of a building in 10-foot lengths, and assume the variation of temperature from summer sun to winter cold would be about 150° Fahrenheit, each stone would expand $\frac{150.10}{103000} = \frac{1}{68}$ of a foot, or, say, about $\frac{1}{6}$ inches, quite sufficient to open the mortar joint and let the water in. The stones should, therefore, be much shorter.

[1] Continued from No. 558, page 115.

GLOSSARY OF SYMBOLS.—The following letters, *in all cases,* will be found to express the same meaning, *unless distinctly otherwise stated,* viz.:—

a = *area,* in square inches.
b = *breadth,* in inches.
c = constant for *ultimate resistance to compression,* in pounds, per square inch.
d = *depth,* in inches.
e = constant for *modulus of elasticity,* in pounds-inch, that is, pounds per square inch.
f = *factor-of-safety.*
g = constant for *ultimate resistance to shearing,* per square inch, across the grain.
g_1 = constant for *ultimate resistance to shearing,* per square inch, lengthwise of the grain.
h = *height,* in inches.
i = *moment of inertia,* in inches. [See Table I.]
k = *ultimate modulus of rupture,* in pounds, per square inch.
l = *length,* in inches.
m = *moment or bending moment,* in pounds-inch.
n = *constant* in Rankine's formula for compression of long pillars. [See Table I.]
o = the *centre.*
p = the *amount* of the *left-hand re-action* (or support) of beams, in pounds.
q = the *amount* of the *right hand re-action* (or support) of beams, in pounds.
r = *moment of resistance,* in inches. [See Table I.]
s = *strain,* in pounds.
t = constant for *ultimate resistance to tension,* in pounds, per square inch.
u = *uniform load,* in pounds.
v = *stress,* in pounds.
w = *load at centre,* in pounds.
x, y and z signify *unknown quantities,* either in pounds or inches.
δ = *total deflection,* in inches.
ρ^2 = *square of the radius of gyration,* in inches. [See Table I.]
$\mathfrak{D}$ = *diameter,* in inches.
$\mathfrak{r}$ = *radius,* in inches.
π = 3.14159, or, say, 3.1-7 signifies the *ratio of the circumference and diameter of a circle.*

If there are more than one of each kind, the second, third, etc., are indicated with the Roman numerals, as, for instance, a, a_{I}, a_{II}, a_{III}, etc., or b, b_{I}, b_{II}, b_{III}, etc.

In taking moments, or bending moments, strains, stresses, etc., to signify at what point they are taken, the letter signifying that point is added, as, for instance:—

m = moment or bending moment at *centre.*
m_{A} = " " " *point A.*
m_{B} = " " " *point B.*
m_{X} = " " " *point X.*
s = strain at *centre.*
s_{B} = " *point B.*
s_{X} = " *point X.*
v = stress at *centre.*
v_{D} = " *point D.*
v_{X} = " *point X.*
w = load at *centre.*
w_{A} = " *point A.*

OLD ART COME TO LIGHT.[1]

VASE DECORATED BY CLODION.
REVUE DES ARTS DECORATIFS

THE fresh light continually being thrown upon classical antiquity through the research of German scholars and archæologists cannot fail to awaken the attention and interest of an intelligent public. Within the past year changes have taken place in the organization of the Imperial Archæological Society of Germany which the experience of the society has shown to be a necessity. But the great ends of research are steadily and practically kept in view. Young men of eminent gifts are still sent out equipped with a generous allowance to bring in the facts so necessary in building up a true science; and in the recent publications it is delightful to meet new names, and to notice, from the excellent work done, the advantages enjoyed by the protégés of the Institute. The material given to us this year is not marked by new and astonishing discoveries, but by so happy an application of sound methods to old problems that hidden truths are at last wrung from them. Taking a new departure, the Institute plans to emphasize more strongly the educational department in its schools in Athens and in Rome, and to adapt its publications more closely to the changed relations of things in the world of discovery. Great as will be the advantages of the new system, yet sadly will be missed the patriarchal figure of Henzen, father of Roman epigraphy, when he retires from his position of First Secretary of the Institute in Rome, a position he has made honorable by a life of self-sacrificing devotion and faithful research. And no less will be the loss in Athens when the eminent Köhler leaves to take the Chair of Ancient History left vacant in the Berlin University by the death of Droyson. For ten long years Köhler has unerringly guided the school of the Archæological Institute at Athens, and he has brought it to its present state of efficiency (a task in no way light), besides having completed the great corpus of Attic Inscriptions, an additional work intrusted to his hands by the Berlin Academy of Sciences. By the side of this man of letters and scholar has stood, and still stands in Athens, the practical architect Dörpfeld, a man endowed with a sharp critical eye and a remarkable independence and originality of thought. The rich fruit offered to education and science by the steady and long-continued activity of a school in Athens under such trained directors shows how wise has been the move toward the organization of a similar institution for America, for under wise management our infant school of Archæology at Athens cannot fail of good results for American classical scholarship.

But let us examine what is offered by the recent publications of the Germans.[2] Not another Pergamon or Olympia here captures attention, but so great a mass of information is brought forward that the reader is fairly bewildered with the many, seemingly, minor items, unless he succeeds in placing each rescued fact in the great mosaic, going to make up our historical picture of the past. And, as he fits these, like polished stones, into the whole, and sees completed harmony of color and form, he becomes aware of the priceless value of even the most unpretentious and apparently insignificant item. But what Dörpfeld has seen and proved about the ancient shrines in the Acropolis, and about the renowned Propylæa, its marble entrance, built by Pericles and Mnesicles, are not minor facts. They are of immense importance in gaining a clearer appreciation of the marvelous architecture of Athens in the day of its glory, and hence in the cultivation of a truer æsthetic taste. Many have been the attempts to explain puzzling irregularities in the ground-plan of the Propylæa, as offered by the ruin. Such divergencies from the harmonious symmetry of Greek architecture are there here that in studying the foundations one begins to believe that an erratic genius, like that in Japanese art, delighting in fantastic irregularities, had, for the moment, taken possession of the old classical architect. But Dörpfeld, by keen observation and combinations from the existing ruins, has shown that just as the great original plan of St. Peter's in Rome was altered and cut down to its present condition, in which much of the harmony Bramante would have given the building has disappeared, so the original design for the Propylæa in Athens was far more harmonious than the one actually carried out. When the new temple, the Parthenon, had been completed in 438 B. C., it was decided to build a worthier approach to the Acropolis, one which, transfiguring the site of the cumbrous old Pelasgicon into a marvel of dignity and beauty, should shine forever like a brilliant diadem on the brow of this "mountain of the gods." And Pericles and Mnesicles planned for this ideal structure such a wealth of marble columns and shady porticos that, could they have been carried out, they would have given the Propylæa double the size, and have heightened still more the effect of the rich groups of temples within and beyond. The central part of the structure, there is every reason to believe, was carried out according to the original plan and still shows us Mnesicles's artistic thought. But both of the wings suffered unpleasant limitations. The two smaller portions facing the west were, no doubt, in part completed. The one on the left, and directly overhanging the western precipices of the Acropolis, seems most nearly to represent the architect's original plan, and had its western wall unbroken, as the ruins show. The opposite, or right-hand part, however, was sadly cut down, but was intended, as architectural details show, to be faced by a graceful colonnade, allowing exit, no doubt, to the shrine of Nike Apteros without. An irregular appearance must have thus been given to the front, most difficult, however, to account for, in view of the symmetry prevailing in the remainder of the structure. It is evident that Mnesicles hoped at some happy day to carry out the whole of his original design, and consequently so laid out the building that at any time additions might be made bringing harmony into his now sadly-contracted plan. Out of these architectural irregularities, Dörpfeld has succeeded in rescuing for us the whole of the master's original thought. Adjoining the existing weighty Doric structure of the centre, with its six columns facing the Parthenon, he concluded that there were to stretch out on either side great colonnades, each one having a front of nine marble pillars. This he infers from the existence, both on the north and south of the rear hall of the Propylæa, of two peculiar architectural projections which have been puzzling to every one who has dealt with them. Dörpfeld, however, from a long practical experience with the ruins of ancient architecture, recognizes in these projections those antæ, or pilasters, which are intended to receive the end of an architrave, and which always presupposes a column or columns beyond. Hence he affirms that it was intended to throw columns out both to the north and south in harmonious rows. The length of these is ingeniously determined by the distance on each side to the old walls of the Acropolis.

But not alone upon these puzzling architectural projections does Dörpfeld found his conclusions. The two walls of the Propylæa, at right angles, and now standing all out of doors and facing the east and north, he has discovered to be surmounted, not by the cornice usual on the exterior of buildings, but by the one used invariably as interior finish! Hence it is evident that the walls, now painful in their nakedness, were not meant to be left as exterior, but intended originally as the interior background to a beautiful portico. It could then only be because of some violent change made in the architect's plan that the walls were left exposed as we now see them. Indeed, there are indications from the site itself of the cause of this violent change. In carrying out his regal plan for an extensive portico Mnesicles must necessarily have trespassed on the south, upon the precincts of the old shrine sacred for ages to Artemis Brauronia, and it is clearly conjectured that the jealous priests of the revered shrine made such a hue and cry against the profane innovation that Pericles (who, it may be remembered, was afterward accused of sacrilege) and his architects were obliged, for a time at least, to relinquish their plan. Hoping later to complete it, they worked, in the meanwhile, upon the north wing. But here, in the midst of their labors the Peloponnesian war broke over unhappy Attica, checking all extensive undertakings, and obliging Pericles to abandon many pet projects for the glorification of the city. We know very well that after the conclusion of the war, lasting like that other of modern times well nigh thirty years, the land was completely exhausted, its income reduced to a mere pittance, and its great statesman, Pericles, in his grave. No wonder, then, that the Propylæa, so glorious in their ruin, are but a shadow of what the great minds which conceived them intended.

The other investigations made by Dörpfeld on the Acropolis lead us back to much older days. Adjoining the Erectheum he has recognized in an unsightly mass, hitherto unexplained, the foundations of the old temple to Athena, built by Pisistratus, and later superseded by the much grander structure, the Parthenon, built near by, by Pericles. Thus, another of the missing links, is brought into the chain of Athenian history, and the growth of the shrines on the Acropolis is traced out for us as never before. Study of existing remains and foundations at Sunium has also shown a later, grander shrine supplanting a humbler, older one of *poros*. Strangely enough the stylobate and steps of the older structure are better preserved than many parts of the marble temple which rose upon it, for through three centuries, block after block of the marble has been carried off by sailors as ship's ballast within the past two hundred years, four whole columns besides much else having thus disappeared. Hence

[1] A letter by Lucy M. Mitchell in the New York *Times*.

[2] Mittheilungen des Deutsches Arch. Inst. in Athen IX u. X Bd. Bulletino dell' Institute di Correspondza Archiologica, 1884. Annali dell' Instituto di Correspondenza Arch. Vol. LVI. Monumenti, Vol. XII.

it is not strange that at last the old *poros* structure is again visible, showing the great inferiority of those older monuments destroyed in the Persian War to their brilliant successors, raised by Pericles and his artist contemporaries to adorn the land, and express thanks to the gods. Unfortunately, eager sailor-hands and wearing tempests have greatly injured the marble friezes which once in an unwonted manner ran around the top of the columns of the pronaos. Enough remains to show, however, that conflicts with centaurs and giants as well as some of Theseus's achievements were here represented, these deeds of gods and heroes being among the most popular dogmas of Attic religion.

Of great value in the history of architecture, but especially with regard to the use of color by the Greeks on their temples is the recognition by Dörpfeld of a choragic monument erected by Nicias in 320 B. C. The blocks composing this monument have long been known, but are sadly scattered. The greater part were discovered early in this century at the west foot of the Acropolis and show excellent work — quite equal, indeed, to that of the Periclean age. It is delightful to see the keen-eyed architect fit these scattered stones one to the other by careful measurements, and finally catch from this recomposition a Doric front with six marble columns and a low pediment, as the façade of the monument Nicias erected in honor of his victory in song, while across its architrave ran the inscription, long well known, recording the details of the happy event. Whether this choragic monument, like the one of Thrasyllos, abutted the live rock of the western steep of the Acropolis, or whether it ended in a wall, the whole having thus the full form of a small temple, we do not know. But it is very evident that the architect of this little monument, when he built its front, had in mind the west façade of the central part of the Propylæa towering above, while the architect of the neighboring Thrasyllos monument had in view the south wing of the same glorious structure. Of greater significance for the history of architecture are the facts rescued from Nicias's marble monument tending to settle the vexed question of the application of polychromy. In the same manner that the details of structures discovered in great numbers in Olympia were colored, so here the marble front of Nicias's monument shows that not only the columns and capitals, but the triglyphs and parts of the pediment were colored.

Another monument showing the fertility of the Greek genius in designing from the same elements different forms is a building reported in detail by Koldemy, as traceable among the ruins of Delphi, but discovered by the French. It consists of a front of eight slender columns standing far apart, and raised three steps from the old pavement of the street. Supporting a wooden architrave and a roof, these columns formed a hall to protect a long pedestal running their whole length. According to the extant inscription, strangely enough carved along the base of the columns in the stylobate, and not as usual in the architrave above, this structure and the votive offerings it sheltered were put up by the Athenians in thanks for victory — and it is believed that on this pedestal once stood in a long row the votive statues or groups sent by Athens here to be admirably protected from the weather by the graceful colonnade.

But not religious architecture alone is dealt with in the publications under consideration. The great aqueduct at Samos, an old Greek bath at Alexandria Troas, powerful fortifications, private houses and shops claim our attention. Among these no monument has excited more notice, either in ancient or modern times, among antiquaries, than the aqueduct at ancient Samos. Herodotus described it with enthusiasm as one of the three greatest works of the Greeks, and modern travellers have stood astonished at the perseverance and skill which with the pick alone pierced through the mountain a tunnel one thousand metres long, and successfully brought together the opposite ends. From Fabricius, one of the younger members of the Institute, we now have a detailed account of the stupendous work. The old site of Samos is poor in water, the only abundant spring being in a valley separated from the ancient city by a mountain ridge, on which its old fortifications may still be seen. It was, according to the ancients, the energetic and powerful tyrant, Polycrates, who, seeing the importance of an unbroken water supply, determined to conduct into his capital the water from the exhaustless fountain-head beyond this mountain, and called the architect Eupalinos from Megara to carry out this undertaking. Modern times have long been acquainted with this delicious source, three chapels of St. John now marking the site. One of these is built directly over the ancient reservoir, and this roomy structure, triangular in form, was nearly full of sweet, cold water when visited by Fabricius. Its roof, now the floor of the chapel, he found supported by fifteen square massive limestone pillars, arranged regularly within roomy walls of masonry, the whole giving the impression of great solidity and quaint antiquity. Doubtless, in older days, this work was well concealed, access to it having been known only to those who had charge of the aqueduct; for, as the reservoir lay far outside the city fortifications, had it been prominent or even exposed, the enemy could have cut off the supply. The water was conducted from the reservoir to the mouth of the tunnel by a channel partly cut in the rock, and partly built out with admirable masonry of polygonal stone, fitted together without cement; in the bottom ran large terra-cotta pipes. Work on the tunnel was begun on both faces of the mountain at once, and traces of the hacking-out with a pointed axe are visible along its whole length, except where secreting lime has made its deposit of centuries. This main tunnel, high enough for a man to stand in with ease, and wide enough for two to pass, while removing the débris they had cut out, has in its bottom another channel, where the pipes were laid. The walls and ceiling of this tunnel are not accurately finished, but there are frequent niches met with for the workmen's oil lamps, and some of them still hold the humble terra-cotta lamps left there so many ages ago. The tunnel in places is now obstructed by great stalagmite columns, but, happily the very spot where the workmen met in tunneling from opposite directions is accessible, and shows that those coming from the south struck a little too high, being obliged to deepen their end to make it exactly level with the one from the north. Besides this slight miscalculation, Eupalinos must have made one other. The deeper channel, already referred to, cut in the bottom of the tunnel for the pipes, indicates that he had to give the water a greater fall than was at first planned. Connected with the depths of this tunnel are three solemn chambers in which seats are cut. Were these apartments where night ever ruled the tyrant's prisons? Gladly we turn from them to the ruins of a Christian shrine, also in the midst of this subterranean work. A part of a trough, doubtless built to catch the water dripping from the walls, indicates the reason for choosing such a site. That this mysterious water was considered holy and wonder-working appears from a similar trough still used to catch the sacred drops in a rock-shrine near by, at the small cloister Panagia Spilani. The spot where the water actually entered the city has, unfortunately, not as yet been found, but according to an inscription now in Tigani (ancient Samos) there were in olden time in the *stoa* bordering the *agora*, two clocks, which told month, day and hour, and were driven by water. One of these clocks had the shape of a bronze dolphin, from the mouth of which the water flowed, and it is most probable that here in this *agora* it was that the waters of the famous tunnel found their goal. Although Samos's famous old water-works are much in ruin, still their preservation is sufficient to induce the present Prince of the island, Constantinos Adosidis, with an energy and courage worthy of his great predecessor, Polycrates, to bring the abundant, health-giving stream again through the old tunnel to his seaport Tigani. For this purpose the cumbrous terra-cotta pipes of Polycrates's days, fastened together with white cement, are being replaced with iron pipes, and the work of clearing out the choked-up passages, and removing the intruding stalagmites and other obstructions is being energetically prosecuted.

While the plan of the late Roman baths has long been well known, those of Caracalla and Diocletian being good samples in Rome, the Greek bath of an earlier day has until within a short time been a mystery. But the recent examination of certain ruins long known in Assos, Alexandria Troas and Ephesos has at last proved that these were baths and not centres of athletic sports, as formerly believed. Neither plan nor finish in these Greek structures was as elaborate or luxurious as in those built by the Romans. An exact account of the oldest, and no doubt, most interesting of these Greek baths is promised us by our own Archæological Institute, which carefully investigated the site during its excavations at Assos. As yet we only know, however, that here no great basin for plunging and swimming existed as in Rome and Pompeii, but that the simple douche, or pouring on of water and washing at bowls, made up the luxury of bathing with the older Greeks. No extensive and elaborate apartments were found in the Assos bath, the main room being a long narrow hall about five metres wide and sixty-eight in length. Along its walls stood many wash-basins, the standard of which have been found. At Alexandria Troas the remains, carefully measured by Koldemy, are, however, somewhat more elaborate; but still the main feature of the structure is the long narrow hall for washing, etc. These rooms are indeed more numerous at Alexandria Troas, while still other apartments, as yet unexplained, are attached to them. The entrance was grand, being decorated with pillars; the interior walls were lined with varied marbles; Lesbian rosso from Africa, cippoleno and serpentine being now scattered on the ground. Iron and copper clamps in the walls indicate the former mode of attachment; a substantial mosaic pavement finished the floor, while glass mosaic lined the arches spanning the halls. A square pillar, in which the pipes still run, furnishes interesting evidence that through this the water was pumped up into a reservoir from whence it was distributed. Niches for wash-basins were found, and pipes and openings show, besides, that once the refreshing douche played from along the walls, about a man's height above the ground. Thus, very ancient vase paintings where bathers stand under the cooling stream and scenes in many a Constantinople bath of to-day seem to find analogies in this bath ruin of Alexandria Troas. Such, moreover, is the technique of the marble as well as the style of its cornices, that Koldemy considers the bath to be cotemporary with the exedra of Herodos Atticus in Olympia.

All those interested in the puzzling growth of the topography of Rome and the relation to the Servian of the equally old, if not older, walls found recently, within a smaller limit on the Celian, Quirinal, and Palatine, will read with attention Richter's account in the last "*Annali*" of the fortifications of Ardea. These seem to mirror a process which may also have taken place at Rome, for as it grew, the small colony on the Rock of Ardea extended its fortifications twice, and as the city sank again the borders contracted to their original extent. Besides such reports, concerning public and religious architecture, we have also disclosed the interior of a large patrician Greek house at the Piræus. In Pompeii, in a provincial Roman dwelling,

closets in the wall have been found, it may be clothes-presses or pantries, thus giving some light as to the modes of house-furnishing in antiquity, while the now uncovered shelves of an apothecary's shop, with bottles, make clearer the arrangements of trade life.

In the department of sculpture the present publications bring much fewer objects of interest, but among those of prime importance for the history of sculpture are several archaic pedimental groups, found in Athens, doubtless over the decoration of very old temples. The illustration in the "*Mittheilungen*" show us that here, as in all very ancient Greek art, whether found on vases, bronzes or stone, the story of Herakles's great labors occupied pre-eminently the artists' fancy. In these remarkable archaic sculptures we have Herakles fighting the dread Hydra, its cruel, snaky body and venomous heads filling up one whole half of the pediment, and calling to mind a similar repulsive rendering of the subject in one of the metopes of the Zeus Temple at Olympia. In another pedimental scene Heracles wrestles with the great sea-god Halios Geron, as in the sculptures at Assos. The faithful charioteer Iolaos stands by in the hero's chariot, looking back at the dreadful contest, while the horses sniff curiously at a crab, fabled in poetry to have assisted the sea god, but put here to fill up the vacant space, and consequently shoved off into the corner of the pediment. The material here, a coarse conglomerate interspersed with sea-shells, is little suited to carving, and there is consequently, besides the awkwardness natural to infant art, a helpless struggle with the stone used, leaving the relief exceedingly rough and uncouth. To help out, color is freely used, but, contrary to all other archaic sculpture, and in harmony with the spirit of the early vases, the figures are painted dark, to stand out against a light background. Of the third archaic pediment only one fragment has been found, but this, like some very archaic reliefs in the British Museum, represents satyrs and mænads, and no doubt belonged to the pediment of some very old temple to Dionysos, as this fragment was found in close proximity to the theatre of that god. Within a few weeks past, as Dörpfeld kindly informs me, he has come upon an old temple of Dionysos near by this theatre, a fact which strongly supports the above conjecture. In these three pedimental groups, which, like the one of the Treasury of Migara at Olympia, are all in relief, we have clearly some of the earliest attempts made by the Greeks to adorn the pediments of their temples. How far down the stream of history seem in contrast the statues of exquisite Parian marble, carved fully in the round, with which the Æginitans decorated their temple! and yet but a few years ago we looked upon these strange, smiling figures from Ægina as representing the oldest pedimental groups of the Greeks.

Did space permit, much might be said of inscriptions found relating to the great Lysippos, of the light thrown upon Attic tombstones of Phidias's time; we might go into the developments of Cypriote art, and for Roman art tell of the wealth of new material found in the cellars of the Villa Borghese; but for all this I must refer readers to the interesting pages of the "*Mittheilungen*" and "*Annali*." I cannot, however, pass in silence some remarkable discoveries in the department of ancient topography. Familiar to us from childhood has been the story of the quaint grotto in Crete where the infant Zeus was born. Often fancy has heard the din of arms made by the graceful corybants at the mouth of the grotto, to drown the cries of the babe god within, that his voice might not reach the lowering Kronos, eager to drown the child who should one day rob him of his throne. We have heard of the faithful goat Amaltheia, also, who, suckling the god in his infancy, gave him strength to become the great Zeus, and herself was immortalized. Plato is one of the earliest writers to refer to this spot, and as in one of his dialogues he makes his three talkers wander from Knossos to the grotto on Mount Ida, we feel that it must have been a beautiful pilgrimage they took in the summer days. Theophrastos tells us that the grotto was full of votive gifts, and Diodorus dwells upon the fields round about, upon the bees that nourished the god here. And now this very grotto on Mount Ida has at last been discovered by Fabricius. On about the highest summit of the mountain is a great plateau, dotted with springs and covered with rich pasturage. Trees are to be seen only near the springs. Terrific storms tearing up and laying low many of the fallen monarchs, the fallen, seared trunks combine with the wild, free landscape to stimulate the fancy of every one privileged to wander here. Near one of these springs is a grotto, where shepherds have long sought shelter for their flocks. Above it rises a perpendicular wall of rock, forming, with the distant pastures, the peaks and scattered trees, a scene of peculiar picturesqueness. In front of this grotto the shepherds were led, for some reason, to dig, and Fabricius found in their hands antiquities of so varied a nature that it was evident that here had been a shrine visited from very remote ages down to the Roman time by worshippers bringing gifts. By those of oldest days were brought, no doubt, the quaint tripods and other sacred vessels, with geometrical decoration exactly like those found in the most ancient parts of Olympia, in Do lona, and in Delos, and thus proving their great antiquity. In the grotto, where even in September the snow which had outlived the summer heat was still lying, were found more than one hundred clay lamps of Roman make, besides ashes and bones from sacrificial fires, all, no doubt, from the secret service of the mysteries. Besides all these there was a figure of a goat, perhaps Amaltheia, so honored as afterward to be deified. Outside the grotto, pedestals bearing traces of the bronze feet of statues which had once decorated them, as well as the broad surface of a rock smoothed-off for an open-air altar for burned offerings, were found. Fabricius's happy supposition that this is the Zeus Grotto of antiquity has since his visit been confirmed by an inscription recently found on a terra-cotta fragment there.

For clearing up the ancient geography of Asia Minor, the English scholar Ramsay has brought forward many valuable points, but, no doubt, for the weightiest contribution concerning Isauria, Eastern Pisidia, and other parts of Central Asia Minor, we must look to our own countryman, Sterrett, who, with the untiring zeal and self-sacrifice of a true traveller, has opened up hitherto unknown regions. The much-disputed site of ancient Tavium, that key to the network of great roads in antiquity traversing Asia Minor, has been finally settled by this intrepid Virginian, and the sites of Lystra and Nea-Isauria discovered, to say nothing of river-courses corrected; and much more. Lystra is too intimately connected with the story of Paul and Barnabas to be unfamiliar to readers of the Bible, but Nea-Isauria has only most recently taken actual form. Scarcely had Dr. Sterrett discovered the site, finally dispelling serious doubts always entertained as to its very existence, when there was brought to light by Dr. Hallor, in Paris, a Sallust manuscript in which many new and startling facts about Nea-Isauria were found recorded; and thus the work of these two devotees of science is found to be absolutely harmonious and necessary one to the other. Frequently, Dr. Sterrett tells me, as he copied an inscription, or appeared to be drawing a map, he did not know whether he would be allowed to live through his work, the suspicious natives threatening his very life with their guns. The maps of his explorations, upon which he has been engaged this summer, are being made by Kiepert, a sufficient guarantee of their excellence, and it must have well repaid Dr. Sterrett to hear Kiepert's delighted exclamation, "You have made the map of Asia Minor," for the opinion of this eminent geographer is one of highest value. The report of these explorations will appear in the publications of the American School of Archæology.

Turning to the light thrown upon history by the new publications of the Institute, we hardly know which subject to take up and which to pass by, so rich is the fund. Athenian families are pictured to us here as we have been accustomed to see delineated only Roman patrician houses; the far-sighted policy of Solon in changing the Athenian coinage is unfolded to us with such clearness that we almost believe that Athens's trade with Italy demanded this revolution, and certainly Solon's desire to secure the prosperity of Athens was attained, if we may judge from the signs of Athenian supremacy in Italian commerce, a supremacy which by the fifth century B. C. seems to have crowded dangerous rivals, and especially Corinth, out of the field.

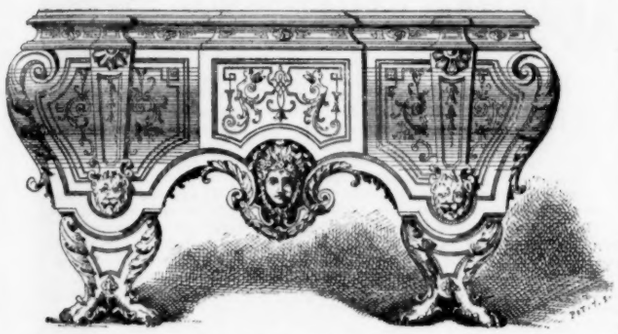
Washerwomen we are not wont to think of as making up any mentionable part in old Greek history; but otherwise teach the inscriptions. There they appear as worthy members of society, doing a share in making offerings to the gods, and this as early as the sixth century B. C. A standard found under the Parthenon débris, and conjectured by Köhler to have held a utensil for besprinkling with holy water, bears the few but telling words, "Smicythe, washerwoman, dedicated a tenth." The fact that of all the trades besides physicians, actors, only washermen and washerwomen are specially designated in the inscriptions seems to indicate the importance to the old Athenian State of even this humble class of carers for the public weal.

What the "*Mittheilungen*" do for Athens, the "*Annali*" and "*Bulletino*" do for the history of Rome. As we hear Hinzen tell of the guards (*frumentarii*) posted around about Rome in the days of the emperors, to prevent brigandage, we are reminded of the gay horsemen that to-day patrol the Via Appia. But the numerous clocks and church-bells of modern Rome must be very different from the time-pieces of the olden time. At first the Romans, perhaps because so absorbed in war, paid little attention to the accurate division of time. Even sun-dials were not known among them as late as the time of the Punic war, the time of day being called out at regular intervals by criers, reminding us of the noonday cry of the muezzin, from the Moslem minarets. Their first sun dial the Romans got from the conquered Greeks in Southern Italy, but seem to have been no less ignorant of its use than they were incapable of appreciating the beauties of Greek art. They put it up in the Forum, imagining that it would serve its purpose quite as well in the changed latitude. For a full century this old time-teller had to do duty, only giving place to a truer one when the Romans had been educated up to a better knowledge by the people they had enslaved. In time sun-dials were found to be such a convenience that they were set up in public squares, baths, in houses and temples, multiplying so rapidly that by the seventh century of the city she could call herself "*oppleta solariis*." Varro describes one of the older sun-dials, known to the Romans at Palestrina, as bearing on its face, not the usual inscription, *Meridies*, but the archaic *Medidies*, and it is of great interest to know that, though as a matter of course much of this old dial, with its inscription, no longer exists, Marucchi has succeeded in showing on the mid-day side of the cathedral a large part still extant, certainly far older than all other similar monuments and far simpler.

Far more might be said here as of vital interest to all friends of antiquity, and, indeed, of humanity, about the descriptions of Mycene-like graves in Thessaly, about a painted tomb in Tanagra, about vases with strange archaic or with beautiful artistic scenes, and

about vast necropoli pouring out their treasure, but space is limited, and the reader must be pointed to the head sources themselves.

AN ARCHITECT'S HUNT AFTER A SMELL.



SOME months ago I was requested by a client to take in hand and thoroughly overhaul, in accordance with more modern ideas, the sanitary arrangements of a house he had just taken on a long lease, and forming one of a terrace in Regent's Park. What I directed was well carried out by a builder accustomed to work of that nature. It comprised the removal of the water-closet from a central position in the house, the finding out and removal of a disused brick-drain at the rear, and the thorough ventilation, inlet and outlet, of the whole drainage system. These, and other operations which I need not mention in full detail, occupied a couple of months, and at their termination my client moved into his new home. He had barely been there a week when he wrote to me, complaining bitterly of a smell that had asserted itself in the house within a day or two of his entering, and the source of which was undoubtedly in the bath-room.

To make all clear to the reader, I may here briefly describe the plan and arrangement of the house. It formed No. 99 of the aforesaid terrace, and its next-door neighbor, No. 100, was on the hall and staircase side of it. The basement floor had a passage under this hall, and a door going into the front area, underneath the steps leading to the front door. The ground floor consisted of the hall, a dining-room to the front, a library behind it, and a couple of rooms, and a w. c. built on as a kind of annex at the rear of the house. The first floor was given up to a large front and a smaller back drawing-room. On the half-landing between this floor and that above was the new w. c., substituted for the old and internal one. (All the pipes — supply, ventilation, and soil — in connection with this were external, as the w. c. itself was carried on cantilevers on the outside of the main back-wall of the house). The second floor contained two bedrooms — front and back. The former was in connection with a dressing-room, fitted in the previous tenant's time with a bath, and one of its walls was that I have referred to as the party-wall dividing us from the next house. This was the room whence the nuisance, of which great complaint was justly made, evidently arose.

The smell was compared by various independent investigators to that of a newly-used w. c., but had withal a hot, close, sulphury element in its composition. It was capricious as regards the times of its occurrence, but was, as a general rule, at its maximum about midday. The bath-room was in size about twelve feet long by eight feet wide, with the bath itself at the door end of the room. Curiously, we found the smell far more intense in that corner farthest away from the bath, *i. e.* in the angle formed by the external wall and the party-wall. I first satisfied myself by a careful examination of all pipes in connection with the bath and of the lead safe tray under it, that there was no possible reason for laying the blame on any of these.

This point clearly proved beyond a doubt, I then proceeded to attack the corner near the external wall and window. The architrave and linings of the latter were removed, and immediately this was done a strong puff of hot fœtid smell was perceived. But no cause presented itself. The floor — a "pugged floor" — had then the boards removed in this particular part of the room, and the wooden skirting of the party-wall was taken down. This last action seemed again to release a "pocket" of stored-up smell, and led to our removing some of the plaster on the same wall. The brickwork was, I found, rough work, as regards the nature of the bricks, and the mortar joints were exceptionally bad — discolored and of so soft a bind that a chisel could be pushed up to its handle in most of them. On trying close to this part of the wall we found beyond a doubt that the smell entered the room here. It was the same thick sulphury smell, and — as my builder declared — had about it a suggestion of a dead and putrefying body. Acting on this suggestion, we set to on a hunt for the corpse of a rat or mouse, sepultured, perhaps, in some small recess in the wall, or between the joists of the floor. But to no end, and we further were enabled to assure ourselves that the smell "oozed out" of the joints of the brickwork.

The architect to the late tenant of the house was now invited to appear on the scene, and to aid us with any information as to the bath that had been added under his superintendence, or as to any other cause to which the nuisance could be attributed. But neither he, nor the builder who did the sanitary work under his directions some few years ago, could aid us with any light. The conclusion we (and another sanitary expert called in) came to, was that we were smelling smoke from next door. But investigations there did not confirm this. There was no fireplace immediately behind the centre of evil. Though still puzzled, yet under much relief at finding no possible reason for thinking that the bath and its pipes had anything to do with it, we resolved to thoroughly calk out the smell, and be content. This was done by clearing out the mortar-joints of the party-wall in the bath-room, repointing in cement, rendering this wall and the space behind the architrave and the window-linings in cement, filling up the space between the ceiling of the room below and the floor boards with pebble-concrete in cement, and filling in behind the skirting. This was finished by December 10. On December 23, my client writes me in despair, "Our work is thrown away; the smell in the bath-room and under the attic stairs adjoining is as bad as before we commenced operations."

On visiting the house when I received this disconcerting news, I found the smell pervading the whole of it in a very strong and noisome form. The drawing-room (under the bath-room, as the reader will remember) was now unusable. The dining-room had a bare trace, but in the basement passage the foul odor was extremely strong. This seemed to point to something being wrong, and acting as the prime cause, either on the basement floor or in the drain system. Our theory, then, was that, arising here, it was carried up to its easiest outlet by means of a flue. We were under the impression that in this party-wall we had only one flue — namely, that from the butler's pantry carried over the basement passage by a "flying flue." This we cut into, but found it free from any smell, and, on putting a pan of boiling water mixed with oil of peppermint at its base, we found no trace whatever of a peppermint smell in the bath-room or other affected rooms. Thus this flue was guiltless, but our researches in connection with it showed us the existence of another, of which we had had no suspicion. It started from a bricked-up fire-place in the hall, and we felt it our duty to submit it to the same tests as the other one. But again with no result.

Unable, then, to track the smell to its origin by means of a continuous channel, we fell back on the theory of its production by a defective drain. We accordingly laid bare and examined the earthenware drain-pipes in the basement. Beyond finding a regular old-fashioned piece of drain-work in the shape of a rain-water pipe from next door, running through the area party-wall, and discharging into *our* system — a proceeding we objected to and altered — there was nothing whatever to take exception to when our drain was laid bare to inspection. Yet there, six feet above the basement floor level, was *the* smell in full force. We now, therefore, having acquitted our own system, naturally accused that of our neighbor's at number 100. They also happened to "have the plumbers in," which gave facilities for making our inquiries. The state of their sanitary arrangements, whatever it was, need not detain us. Amongst other things we found the supply-pipe of their boiler leaked badly, and this was accountable for the great dampness of the party-wall just above the point to which we had tracked the smell. We were now getting "warm," as children say. Unable to examine our neighbor's kitchen fireplace as thoroughly as we wished from *his* side of the wall, we had to do so as far as we could from our own. For, as measurements showed now that it was situated just where "our smell" was tracked to, we felt it important to learn if it were responsible for this latter. And a brick knocked out of the four-and-one-half-inch backing of the kitchen fireplace of number 100 revealed to us that we were indeed near the end of our search, and had found the starting-point and cause of the nuisance that we had been hunting for so long. The mortar-joints were full of larvæ and full-grown beetles. These, though many, were not enough to cause so great an effect. But further hacking away the wall proved that the flue, after being "gathered over the opening, dipped down again and formed a pocket impossible, or nearly so, to sweep and clean out. This was *full* of the bodies of dead, putrefying, baking black beetles mixed with smouldering soot. And this was the origin of "the smell" — an ignominious discovery may be, but still an experience that it is not, perhaps, useless to set on record.

Little could be done, by the way, to effect its cure. Our neighbor's experience as to his own drains had so wrought upon him that, Pharaoh-like, "he hardened his heart," and objected to having "any more men about the house." But, having found no reason to fear typhus from bad drainage, we were, at all events, much relieved in mind; a cast-iron pipe now leads *most* of "our smell" direct from its source to the open air, and it no longer finds its way, in full force, up the next door flue, and thence by defective joints into my client's house. — *C. Harrison Townsend in the Sanitary Record.*

Scaffolding in a Church Eighteen Years.— Phillip Igle & Co., of Reading, have just finished frescoing Gernant's church, near Lees port. The building of the edifice was commenced nearly twenty years ago, and eighteen years ago it was so far completed that the scaffolding was put up on the inside for the plasterers. Then the congregation worshipped in the basement of the church these eighteen years, the scaffolding remaining up in the main audience room until the recent frescoing was completed, when it was taken down, — *Allentown, Pa., Item.*

COMMUNICATIONS

NORWAY PINE *VS.* SPRUCE.

NEWARK, N. J.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—A question has arisen as regards the relative strength between Norway and spruce timber when used for beams. If in your power to give us any information on this subject we shall be very much obliged. The Norway in question comes from the northern part of Michigan, and is used largely for building purposes in the West. The spruce with which we wish to compare this comes from Maine. The Norway is well seasoned, and was cut nearly two years ago, while the spruce is of this year's production. Messrs. Stahlen & Steiger, architects of this city, suggested that you might be able to give us the needed information. The size of timber in question is 2″ x 12″ x 16′. Yours respectfully, J. S. H. CLARK & CO.

[ACCORDING to the tables given in Rivington's "*Notes on Building Construction*," the wood of the American red pine (*Pinus verbra or resinosa*), which is known locally in this country as Norway pine, has only about two-thirds the transverse strength of spruce. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

INVESTING IN WINZES. — It is safe to say that three-fourths of those who deal in mining stocks through the medium of the boards never saw a mine, and that less than one-half have any knowledge of how a mine is worked. That people should make serious mistakes in their speculations through ignorance of these matters is not to be wondered at. Perhaps the greatest blunder on record was made by a gentleman of decided Teutonic origin, who visited my office one day and asked, point-blank: "Haf dey schtruck dot vinze?" "What winze do you refer to," said I. "Dot vinze in the Oonion Consolidated mine," was the ready response. "There's no winze in the Union Consolidated mine that they are likely to strike at present," I answered, and then, thinking the man might be a little confused in his mining knowledge, I asked: "What do you mean by a winze? What do you suppose a winze is?" "A vinze," he shouted, with a knowing smile, "oh, a vinze is a body of ore." "No it isn't," said I, and, taking a pencil, I drew him a little sketch of a winze, and explained to him that it was a small shaft sunk from one level to another, generally for the purpose of ventilation. "Is dot a vinze?" he fairly yelled, in the most astonished manner; "den, by gracious, I lose me tousands und tousands of dollars on dose vinzes. Every dime I see dey have started a vinze, or schtruck a vinze, I buy der schtocks, and every dime dey go down right avay. It always was a wonder to me why de Comstocks didn't pay more dividends and levy fewer assessments ven dere vas so many hundred vinzes in der mines." He walked out, leaving the door open, and I could hear him repeat at every third step as he went down the stairs: "Oh, dose vinzes! Oh, dose vinzes!" — *San Francisco Argonaut.*

THE BELLS OF ST. MICHAEL'S, CHARLESTON, S. C.—"The Church of St. Michael's," said Comptroller Trenholm to a *Post* reporter yesterday, "was looked upon with veneration by the inhabitants of South Carolina as a memento of old colonial days. It was built at the commencement of the eighteenth century after the designs of a London architect, a pupil of Sir Christopher Wren of St. Paul's Cathedral fame. Sir Christopher himself suggested many of the features, and the design bears a general resemblance to that of St. Martin-in-the-Fields, facing Trafalgar Square, in London. The spire was noted as being one of the finest specimens of architecture in America. The bells of St. Michael's have a curious history. They were originally manufactured in England, and were a gift to the colony. When the British, during the Revolutionary War, captured the city they took the bells, and on their evacuation they packed them up and sent them to England. After the treaty of peace had been consummated, negotiations were opened in London for the return of the bells by the first American Minister to Great Britain. He succeeded, and the bells were sent to Charleston, and upon their arrival were received with triumphant ovations, and escorted by a large procession to the church, in the belfry of which they were replaced. During the late Civil War the citizens of Charleston were desirous of protecting the bells from danger, and, as the steeple of St. Michael's was made the target for the cannon of the besiegers, the bells were taken down and sent to Columbia for safe keeping. When Sheridan's army took Columbia the shed in the yard of the State House, in which the bells had been placed, and which also contained the marble friezes and other sculptures intended for the decoration of the Capitol, were broken in and the sculptures and bells were smashed into fragments, and the sheds were then set on fire. At the conclusion of the war the pieces of the bells were carefully gathered together, boxed, and shipped to the commercial house of Frazier, Trenholm & Co. of Liverpool, together with extracts from the records of St. Michael's, showing where the bells were cast, and the proportions of the metals forming their component parts. Upon inquiry it was found that there was still in existence in England the firm of bell-founders, unchanged in name, and consisting of the descendants of the proprietors at the time the bells were made. The records of this firm contained descriptions of the bells, and the proportions there given were found to correspond with those furnished from Charleston. The bells were made anew, therefore, of the same metal, and for the fifth time they were carried across the Atlantic, and arrived safely at Charleston. Their return was made the occasion of great rejoicing in the city."— *Washington Post.*

TRADE SURVEYS

EVERY week develops some additional indications that the country is about to pass through another era of unusual activity, and possibly, of higher prices. The leaders in trade, industry, transportation and finances, are, as yet, not apprehensive of an undue stimulus to production, such as would precipitate artificial prices, and thus jeopardize the broad prosperity visible on all sides. At the same time we are in some danger. If we are the danger will be short-lived. Four years ago it produced disastrous results. Fourteen years ago it was followed by a five or six years' panic. It is not, therefore, surprising that the commercial and manufacturing world is afraid of any sudden or unprepared-for expansion of demand. The productive capacity of the country is equal to all probable or possible requirements. Special causes have contributed to the present exceptional activity. One was last spring's strikes. The monetary interests, in the particular shape they have taken during the past twelve months, have had something to do with it. The production of raw material has not kept pace with the expansion of demand. Stepping for a moment into an outside field, in order to illustrate, we find a general shortage in the Australian and Montevidean wool supply. Prices have consequently advanced in Australian, European and American markets. Before the Western world was apprised of the danger our American markets were filled with European cloth, and in consequence, our American manufacturers have been obliged, during the fall trade, to sell the products of their looms at low price, in competition with imported goods. The entire world is getting ready for an advance on spring goods, due to high-priced wool, and higher-priced labor, supplemented by an extraordinary demand, the foundation for which has been laid during the past few months. Even cotton is sympathizing. Textile products generally will, in all probability, command higher prices next spring and summer. Hides, leather, boots and shoes, are also threatened with improving prices. Then, again, the possibility of a fresh strike agitation is to be kept in sight. But the probabilities in that direction will be more clearly discerned upon the adjournment of the Knights of Labor Convention which meets at Richmond next week. Should a fresh agitation be precipitated upon the country, it will produce very undesirable results in many directions. It is not often that wide-spread labor agitations are followed by beneficial results, but this year's agitations are somewhat of an exception — the reasons for which have been heretofore given. The immediate effect of such an agitation, or even its announcement, would be to arrest hundreds of projected building, railway, and manufacturing operations. It is probable that labor is intelligent enough to not jeopardize the expanding prosperity by any such action. The building-trades have been accorded their nine-hour demand and their higher pay, and as they, as a body, mostly stand in a separate organization, outside of the Knights of Labor, they will probably decide this matter for themselves. The Knights, however, are a conservative body — at least, have that reputation — and, in the last agitation, took no hand whatever, leaving it to the isolated trades-unions, to which the members of the building-trades generally belong. The same upward tendency is observable in several other branches of industry. In iron and steel making prices have advanced about $2 per ton in muck-bars, bar-iron, tank, plate, shell, and in one or two shapes of bridge-iron. Cast and wrought pipe have reached their highest probable limits. Steel rails cannot advance much higher because of threatening importations. Old rails have gone up as high as $22 per ton at tide-water, and there they stand. Steel rail-blooms have advanced to $26, at which figure they are $1 per ton beyond the reach of buyers. Crude iron, including foundry, forge, and Bessemer, is about advancing 25 to 50 cents per ton, even under an enormous production, amounting to over 120,000 tons per week. The same tendency is observable in other industries. The price of anthracite coal has been advanced 15 cents per ton, October 1, and a further advance will take place in November, and probably in December. While, as yet, there has been no advance in lumber, firmer prices are being realized for hardwoods, especially walnut, the best grades of which are being largely exported. Under these influences it is not at all surprising to find a general anticipation of a higher range of prices all along the line of industry. It is possible that this advance can take place without producing any very harmful results. The conservatism and experience and foresight of the managers of our industries can avert evil, if the lessons of experience are not well learned, it is possible for us to rush into the quagmire which arrested our progress for so many years. But there is no use in borrowing trouble. There is not an industry that can be named but which is prosperous. Labor is getting the biggest slice, but capital, under the strong competition for opportunity, is content with the moderate share it is receiving. The ultimate outcome will be, that building activity will be greatly stimulated. The higher wages and general employment help to create a desire for homes, and this desire is the foundation of our great house-building activity. Some of the most careful thinking men in the country have quite recently reiterated previously-expressed opinions that the year 1887 will be a repetition of 1886, with this advantage: that margins will be wider, and that capital will be more fully employed; and that production will reach its maximum limits. The same opinion is entertained by some of the best building and money-lending authorities in the West. As long as capitalists are willing to shower their money into new enterprises, so long may we rest content; but frequently, money-lenders are blind to their own interests, and throw millions upon millions, where it is soon lost or absorbed. Such has been the case several times in our railroad-building experience. Yet the greed of the thousands who desired to become suddenly rich laid the basis of our great railway system. Had railroads only been built as fast as there were assurances of immediate and sufficient returns, there would not be more than half the railway mileage there is to-day. The hungry investors everywhere tossed their savings into the arena, and our railway system grew up in the ownership of the shrewd manipulators of values. The result of this has been to create a wholesome fear of railway speculation, and to crowd money in other directions. The supply of money will soon be much greater than it now is, and this supply will be one of those coming factors which will help to settle the labor question, in a way which neither employers nor employed are at present anticipating. In whatever department of industrial activity we look we discover healthy signs. There are very few indications that production will exceed reasonable limits. Small industries are springing up, and the wage-workers are, with few exceptions, well employed at wages which guarantee a heavy demand.